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**Traffic Impact Study**

**301 W. Broad Street**

**City of Falls Church, VA**

**January 23, 2013**

**Prepared for:**

Rushmark Properties LLC  
2900 Fairview Park Drive  
Falls Church, VA 22042



**GOROVE / SLADE**

Transportation Planners and Engineers

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## INTRODUCTION AND SUMMARY

### *Purpose and Study Objective*

This report presents the findings of a traffic impact analysis for the proposed redevelopment of 301 W. Broad Street located in the City of Falls Church. The site is bounded by W. Broad Street (Route 7) to the north and W. Annandale Road to the south. The development, which is planned to consist of one multi-use building featuring a 60,000 square foot supermarket, 282 apartments, and 3,470 square feet of ground floor retail, is anticipated to be complete in 2016. This study evaluated the proposed development assuming a 60,883 square foot supermarket, 294 apartments, and 4,011 square feet of ground floor retail, all of which are slightly larger than their currently proposed areas, in order to allow for flexibility in the event there are any minor adjustments to the final development plan floor area calculations.

The following tasks were completed as part of this study:

- A scoping meeting was held on June 21, 2012 with City of Falls Church staff, which included discussions about the parameters of the study and relevant background information. A scoping letter stating the parameters and assumptions used in the analysis herein is included in Appendix A.
- Field reconnaissance in the vicinity of the site was performed to collect information related to existing traffic controls, roadway geometry, and traffic flow characteristics.
- Weekday AM and PM peak period traffic counts were conducted at the study intersections on Thursday, June 7; Tuesday, July 10; and Tuesday, August 28, 2012. Saturday peak period traffic counts were conducted on the following Saturdays: June 2, July 14, and August 25, 2012.
- Future without development traffic conditions were projected based on an inherent growth of 1.0% compounded annually.
- Proposed site traffic volumes were generated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) Trip Generation, 8<sup>th</sup> Edition publication.
- Future with development traffic conditions were projected based on regional growth, existing regional and site traffic patterns, and the proposed development plan.
- Intersection capacity analyses were performed for the existing conditions (2012), future conditions without development (2016), and future conditions with development (2016) during the weekday peak hours at the intersections located within the study area.
- As requested at the scoping meeting, sight distance analyses were performed at each of the site access points.
- As requested at the scoping meeting, shared parking for the proposed redevelopment was addressed.
- As requested at the scoping meeting, a full intersection analysis was performed at the W. Annandale Road and S. Maple Avenue intersection to evaluate potential left turn phasing improvements and roundabout performance.
- As requested at the scoping meeting, travel demand management policies and strategies were determined for the proposed redevelopment.

Sources of data for this study include the City of Falls Church, VDOT, and the office files and field reconnaissance efforts by Gorove/Slade Associates, Inc.

## ***Executive Summary***

### ***Site Location and Study Area***

The subject development is located in the City of Falls Church, on the south side of W. Broad Street (Route 7), west of Maple Avenue, and both due east and north of W. Annandale Road. It is in close vicinity to four major commuter corridors: I-66, Route 7, Route 29, and Route 50. The site is currently occupied by a 26,298 square foot post office and a 6,000 square foot restaurant (Anthony's Restaurant). The study area consists of thirteen intersections, both local and regional in nature, four of which are the existing site's driveways. The proposed development will continue to be served by four site driveways; although the positioning and access arrangement of these entrances will be altered by the development plan.

### ***Description of Proposed Development***

The 2.63-acre 301 W. Broad Street site is currently zoned Central Business (B-2). The project is a special exception application to construct a multi-use building featuring a 60,000 square foot supermarket, 282 apartments, and 3,470 square feet of ground floor retail. Access to the site is currently provided via two full-access entrances along W. Broad Street, in addition to a one-way inbound movement only entrance along W. Broad Street. Also, there is a one-way outbound movement only entrance along W. Annandale Road. Access to the proposed development will be provided via two partial-access entrances along W. Broad Street, the westernmost of which will be a one-way right-out only access used exclusively for loading operations, trash collection, and service vehicle access. In addition, two full-access site entrances are proposed along W. Annandale Road. The site will be served by approximately 575 parking spaces within a below-grade parking garage. The development is anticipated to be complete in 2016.

### ***Principal Findings, Conclusions and Recommendations***

The analysis contained herein presents the existing conditions, future conditions without the proposed development, and future conditions with the proposed development. Based on the above guidelines, the analysis presented in this report supports the following major conclusions:

#### **Existing Conditions (2012)**

Weekday traffic counts were conducted at the study intersections during the AM and PM peak periods on Thursday, June 7; Tuesday, July 10; and Tuesday, August 28, 2012. Saturday peak period traffic counts were conducted on the following Saturdays: June 2, July 14, and August 25, 2012. The intersection volumes were balanced to reflect a consistent baseline for the volume projections within this report.

Intersection capacity analyses were performed for the existing conditions at the study area intersections during the weekday morning and afternoon peak hours, as well as the Saturday peak hour. *Synchro, version 7.0* was used to analyze the study intersections with results based on the Highway Capacity Manual (HCM) methodology. For the purpose of this analysis, it is desirable to achieve a LOS D or better for each approach of an intersection. If an acceptable level of service cannot be achieved, then it is desirable for the future with development conditions to be no worse than the network without the new development. All of the study intersections' approaches currently operate at acceptable levels of service during the weekday morning, afternoon, and Saturday peak hours with the exception of the southbound S. Maple Avenue approach at the W. Broad Street and N./S. Maple Avenue intersection during the weekday PM peak hour only.

Based on the queuing analysis, peak hour queue lengths currently exceed the storage lengths in one or more of the lane groups at the following intersections during one or more of the peak periods:

- W. Broad Street and W. Annandale Road
- W. Broad Street and Little Falls Street (PM only)
- W. Broad Street and N./S. Maple Avenue (Saturday only)
- E./W. Broad Street and N./S. Washington Street (PM and Saturday only)

As there are currently no road improvements being constructed at the study intersections, there was no mitigation assumed in the analysis moving forward into the future without development analysis.

#### **Future Conditions without Development (2016)**

Traffic volumes were projected for the year 2016 without the proposed redevelopment of 301 W. Broad Street. The base traffic volumes used in this scenario were the existing (2012) conditions volumes. A 1.0% annual inherent growth rate was applied to these volumes.

As mentioned previously, it is desirable to achieve a LOS D or better per approach. If an acceptable level of service cannot be achieved, then it is desirable for the future with development conditions to be no worse than the network without the new development. Just like the existing conditions, all of the study intersections' approaches will continue to operate at acceptable levels of service during the weekday morning, afternoon, and Saturday peak hours with the exception of the southbound S. Maple Avenue approach at the W. Broad Street and N./S. Maple Avenue intersection during the weekday PM peak hour only.

Based on the queuing analysis, peak hour queue lengths will continue to exceed the storage length in one or more of the lane groups at the following intersections during one or more of the peak periods:

- W. Broad Street and W. Annandale Road
- W. Broad Street and Little Falls Street (PM only)
- W. Broad Street and N./S. Maple Avenue (Saturday only)
- E./W. Broad Street and N./S. Washington Street (PM and Saturday only)

As there are currently no road improvements being funded or planned at the study intersections by 2016, there was no mitigation assumed in the analysis moving forward into the future with development analysis.

#### **Future Conditions with Development (2016)**

The proposed development plan calls for the construction of an approximately 60,000 square foot supermarket, 282 apartments, and 3,470 square feet of ground floor retail in one multi-use building. This study evaluated the proposed development assuming a 60,883 square foot supermarket, 294 apartments, and 4,011 square feet of ground floor retail, all of which are slightly larger than their currently proposed areas, in order to allow for flexibility in the event there are any minor adjustments to the final development plan floor area calculations. Access to the proposed development will be provided via two partial-access entrances along W. Broad Street, the westernmost of which will be a one-way right-out only access used exclusively for loading operations, trash collection, and service vehicle access. In addition, two full-access site entrances are proposed along W. Annandale Road. The proposed redevelopment will generate approximately 238 new trips during the weekday morning peak hour, 493 new trips during the weekday afternoon peak hour, 439 new trips during the Saturday peak hour, and 4,645 new weekday daily trips.



As mentioned previously, it is desirable to achieve a LOS D or better per approach. If an acceptable level of service cannot be achieved, then it is desirable for the future with development conditions to be no worse than the network without the new development. Just like the existing and future without development conditions, all of the study intersections' approaches will continue to operate at acceptable levels of service during the weekday morning, afternoon, and Saturday peak hours with the exception of the southbound S. Maple Avenue approach at the W. Broad Street and N./S. Maple Avenue intersection during the weekday PM peak hour only.

Based on the queuing analysis, peak hour queue lengths will continue to exceed the storage length in one or more of the lane groups at the following intersections during one or more of the peak periods:

- W. Broad Street and W. Annandale Road
- W. Broad Street and Little Falls Street (PM only)
- W. Broad Street and N./S. Maple Avenue (PM and Saturday only)
- E./W. Broad Street and N./S. Washington Street (PM and Saturday only)

Based on these results of the capacity analysis, the following mitigation measures are recommended for the future with development scenario:

- *Intersection of W. Broad Street and N./S. Maple Avenue*
  - Adjust the signal timings during the weekday PM peak hour only by reallocating 2 seconds of green time from the mainline W. Broad Street thru phases to the N./S. Maple Avenue thru phases.

Since the results of the analysis showed a non-acceptable level of service for a single approach the southbound S. Maple Avenue approach at the W. Broad Street and N./S. Maple Avenue intersection during the weekday afternoon peak hour only in all three study scenarios, signal timing mitigations were evaluated at this intersection. It was determined that by simply making a very minor signal timing adjustment to traffic signal at the W. Broad Street and N./S. Maple Avenue intersection during the PM peak hour only, all intersection operations within the study area would meet the City's intersection operation standards. Furthermore, this signal timing adjustment will reduce the aforementioned southbound approach's queue length so that it or any of the other lane groups at this intersection exceed the link/storage length during the weekday afternoon peak hour.

In summary, with the recommended signal timing mitigation measures outlined above implemented, all intersection operations within the study area will meet the City's intersection operation standards, thus the proposed redevelopment will have a negligible impact on the surrounding intersections.

## BACKGROUND INFORMATION: PROPOSED DEVELOPMENT (SITE AND NEARBY)

### *Description of On-Site Development*

This study is being performed to examine the potential traffic impact of the proposed redevelopment of 301 W. Broad Street, as shown on the associated development plan, on the area's future roadway network. The site is bounded by W. Broad Street to the north and W. Annandale Road to the south. A site location map is shown in Figure 1 and the site's development plan is shown in Figure 2. The subject parcel is currently zoned Central Business (B-2). The development is anticipated to be complete in 2016.

The project is a special exception application to construct up to approximately 60,000 square foot supermarket, 282 apartments, and 3,470 square feet of ground floor retail in one multi-use building. Access to the proposed development will be provided via two partial-access entrances along W. Broad Street, the westernmost of which will be a one-way right-out only access used exclusively for loading operations, trash collection, and service vehicle access. In addition, two full-access site entrances are proposed along W. Annandale Road.

### *Planned Transportation Improvements*

Neither the City of Falls Church's Comprehensive Plan, Five-Year Capital Improvements Program, or VDOT's Six-Year Improvement Program (SYIP) propose any major long-term transportation improvements within the study area.

### *Scope of Study*

The study area consists of thirteen intersections, four of which the site traffic will use to access the site. The study area was determined based on the scoping meeting held with City of Falls Church staff on June 21, 2012. A copy of the agreed-upon scoping document is included in Appendix A. The following intersections were identified for inclusion in this study:

1. W. Broad Street and W. Annandale Road/Broadale Village Center;
2. W. Broad Street and Little Falls Street;
3. W. Broad Street and N./S. Maple Avenue;
4. W. Broad Street and N./S. Washington Street;
5. W. Annandale Road and S. Maple Avenue;
6. W. Annandale Road and Gundry Drive;
7. Park Avenue and Little Falls Street;
8. Park Avenue and N. Maple Avenue;
9. W. Broad Street and Anthony's Restaurant West (Future Loading Access Intersection);
10. W. Broad Street and Anthony's Restaurant East (Intersection to be Removed);
11. W. Broad Street and Post Office Entrance (Future Retail Access);
12. W. Annandale Road and Post Office Exit (Future Residential Access); and
13. W. Annandale Road and Retail Access (Future Intersection).

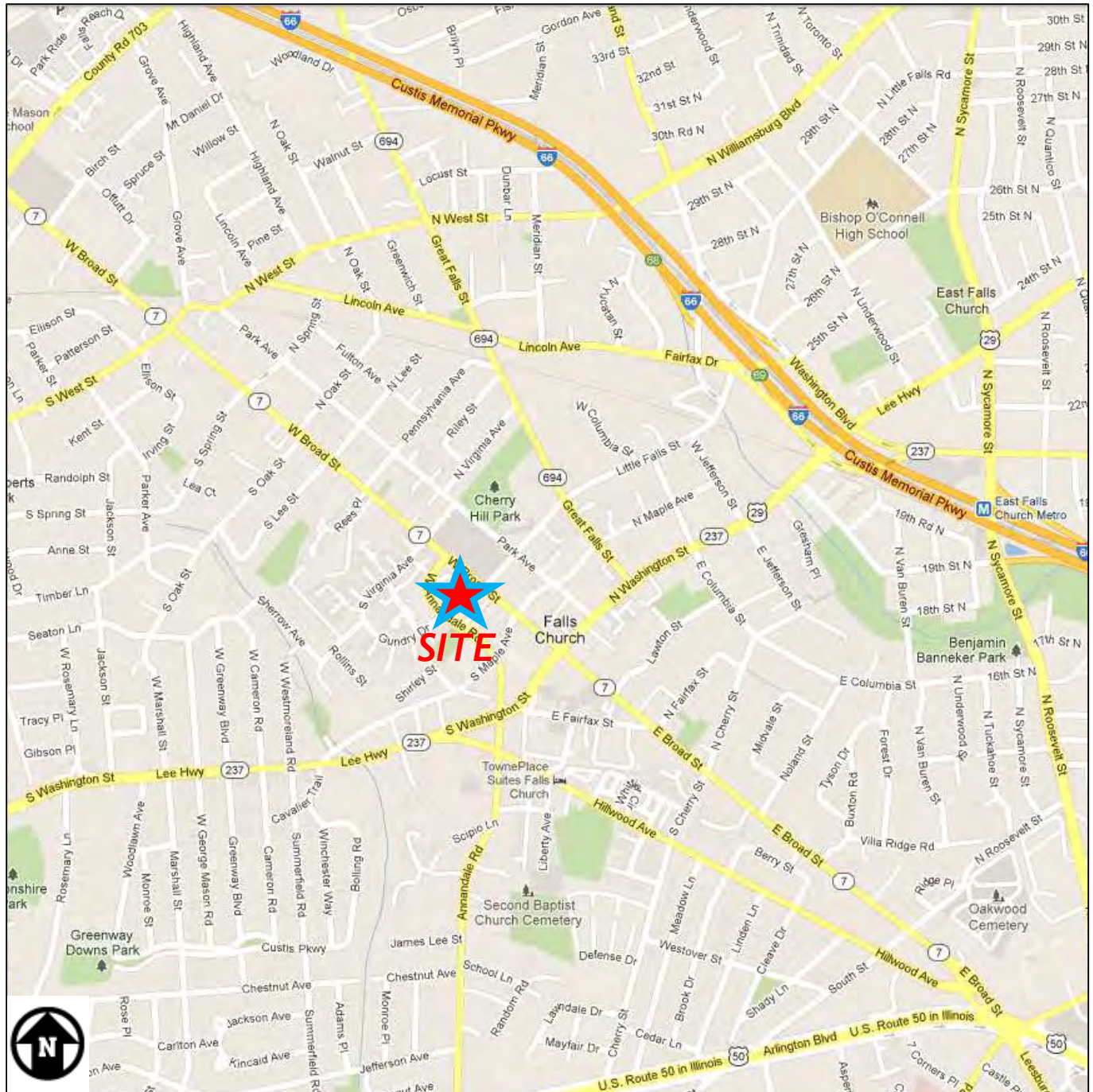


Figure 1: Site Location



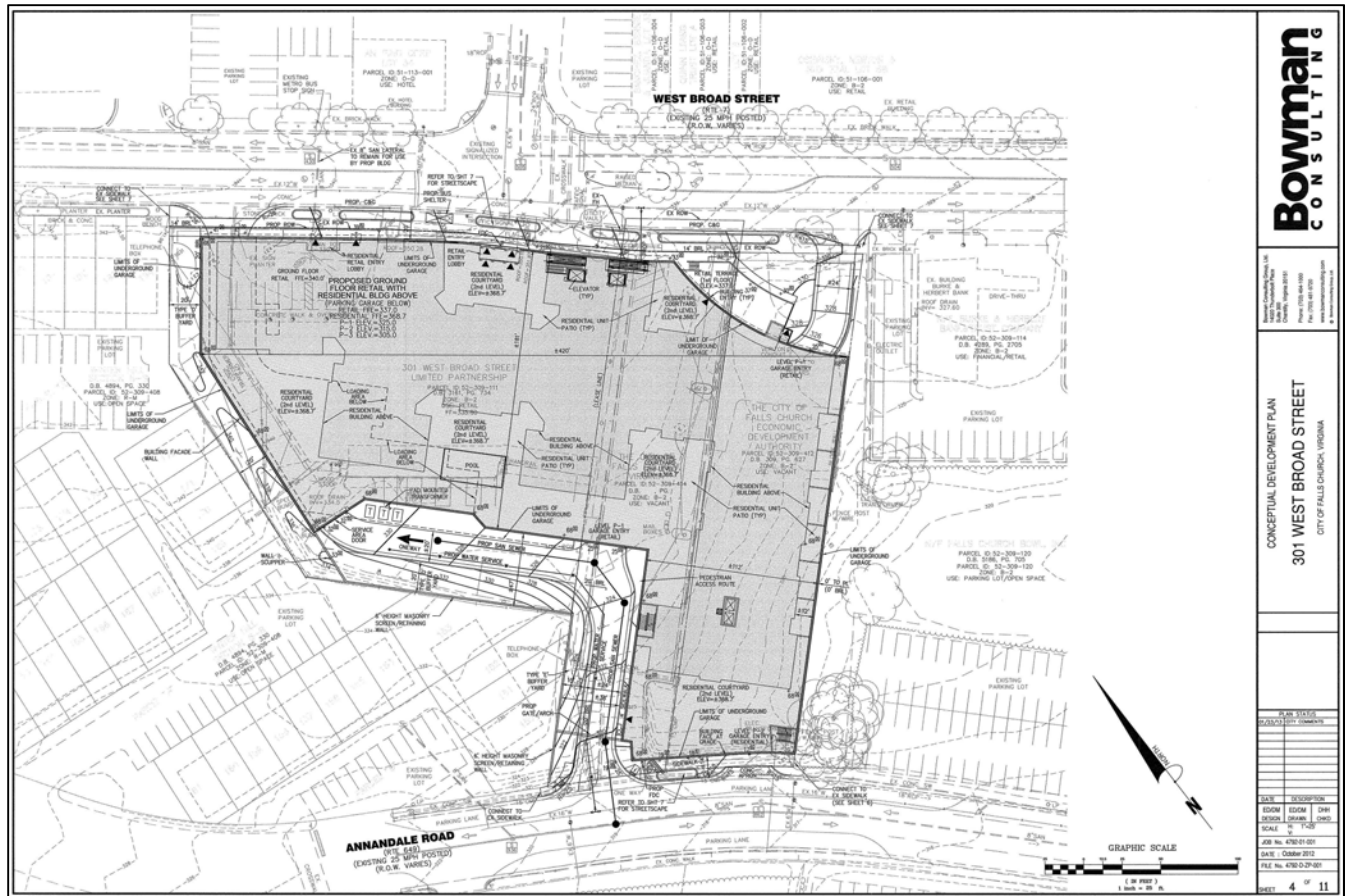


Figure 2: Proposed Development Plan

This report presents the findings of analyses performed for the following conditions:

- **Existing Conditions (2012):** Considers existing traffic volumes and existing roadway configurations.
- **Future Conditions without Development (2016):** Considers future traffic conditions for the year 2016 with the background growth, but without the proposed development.
- **Future Conditions with Development (2016):** Considers future traffic conditions for the year 2016 (build-out year) with the background growth and the proposed development.

The results of the analysis and the traffic impacts associated with the proposed development plan are presented in the Conclusion section of this report.

## Roadway Network

A description of the major roadways within the immediate vicinity of the site is presented below. The existing lane configuration and traffic control in the study area is shown in Figure 3.

E./W. Broad Street (Route 7) is a four-lane undivided principal arterial with left turn bays at its signalized intersections with N./S. Washington Street and N./S. Maple Avenue. The posted speed limit is 25 mph within the study area. Published historical traffic count data from VDOT shows that in 2011 W. Broad Street carried approximately 28,000 vehicles per day while E. Broad Street carried approximately 23,000 vehicles per day.

N./S. Washington Street (Route 29) is a four-lane divided principal arterial with left turn bays at its signalized intersection with E./W. Broad Street. The posted speed limit is 30 mph within the study area. Published historical traffic count data from VDOT shows that in 2011 N. Washington Street carried approximately 26,000 vehicles per day while S. Washington Street carried approximately 14,000 vehicles per day.

N. Maple Avenue is a two-lane undivided local street. The posted speed limit is 25 mph within the study area. There is no published historical traffic count data from VDOT available on this roadway.

S. Maple Avenue is a four-lane undivided collector street. The posted speed limit is 25 mph within the study area. There is no published historical traffic count data from VDOT available on this roadway.

W. Annandale Road (Route 6609) is a four-lane undivided collector street west of S. Maple Avenue that transitions into a two-lane undivided section with on-street parking on both sides approximately 175 feet east of S. Maple Avenue. There is no on-street parking provided along the section of W. Annandale Road between Broad Street and Gundry Drive. The posted speed limit is 25 mph within the study area. Published historical traffic count data from VDOT shows that W. Annandale Road carried approximately 6,400 vehicles per day in 2011.

Little Falls Street (Route 6797) is a two-lane undivided collector street with on-street parking provided on the east side of the street. The posted speed limit is 25 mph within the study area. Published historical traffic count data from VDOT shows that Little Falls Street carried approximately 3,100 vehicles per day in 2011.

Park Avenue is a two-lane undivided local street. On-street parking exists along both sides west of Little Falls Street and on the south side of the street along the section of Park Avenue between N. Washington Street and N. Maple Avenue. The posted speed limit is 25 mph within the study area. There is no published historical traffic count data from VDOT available on this roadway.

Gundry Drive is a two-lane undivided local street with on-street parking provided along both sides. The posted speed limit is 25 mph within the study area. There is no published historical traffic count data from VDOT available on this roadway.

### ***Bicycle/Pedestrian Facilities***

Bike lanes are absent within the study area and the entire City of Falls Church. The site is located within a half-mile of the Washington & Old Dominion (W&OD) Trail, which extends 45 miles from Shirlington to Purcellville. To improve future bicycling conditions within the study area, the City's Pedestrian, Bicycle, and Traffic Calming Strategic Implementation Plan recommends the construction of on-street bicycle lanes in the study area along the southbound direction of Little Falls Street north of Park Avenue, on both sides of N./S. Maple Avenue between Gibson Street and Park Avenue, and along the northbound direction of N. Maple Avenue north of Park Avenue. Additionally, shared lanes designated with sharrows to guide bicyclists are proposed along Park Avenue. Lastly, there is one Capital Bikeshare station proposed in the study area, located in the northeast property corner of the 301 W. Broad Street site.

The roadways in the vicinity of the proposed development provide satisfactory pedestrian facilities and connectivity throughout the area. Continuous 4 to 8 foot wide sidewalks line all of the study area's roadways on both sides of each street. Continental crosswalk markings or brick imprint crosswalks link sidewalk segments at all of the study area's signalized intersections with the exception of the following crossing maneuvers: the southern east/west crossing movement at the W. Broad Street and N./S. Maple Avenue intersection, the southern east/west crossing movement at the W. Annandale Road and N./S. Maple Avenue intersection, and the western north/south crossing movement at the W. Broad Street and Little Falls Street intersection where no crosswalk delineations exist. The City's Pedestrian, Bicycle, and Traffic

Calming Strategic Implementation Plan proposes a new crosswalk in the location of the aforementioned missing crosswalk at the W. Broad Street and Little Falls Street intersection.

Adequate pedestrian countdown signals are present at the E./W. Broad Street and N./S. Washington Street intersection for all crossing movements. At the three W. Broad Street intersections with W. Annandale Road, Little Falls Street, and N./S. Maple Avenue, there are pedestrian signals serving each marked crossing movement; however, the pedestrian signals are an older model without the countdown display. Currently, these are in-compliance with the Manual on Uniform Traffic Control Devices (MUTCD) until they reach the end of their serviceable life, when they will need to be replaced with pedestrian countdown signals since the pedestrian change interval for all of these crossings is longer than 7 seconds. There are no pedestrian crossing signals at the W. Annandale Road/S. Maple Avenue intersection and the Park Avenue/Little Falls Street intersection. The City's Pedestrian, Bicycle, and Traffic Calming Strategic Implementation Plan proposes the installation of pedestrian countdown signals along all crossing movements at the five aforementioned study area intersections that either lack the countdown displays or lack pedestrian signals altogether.

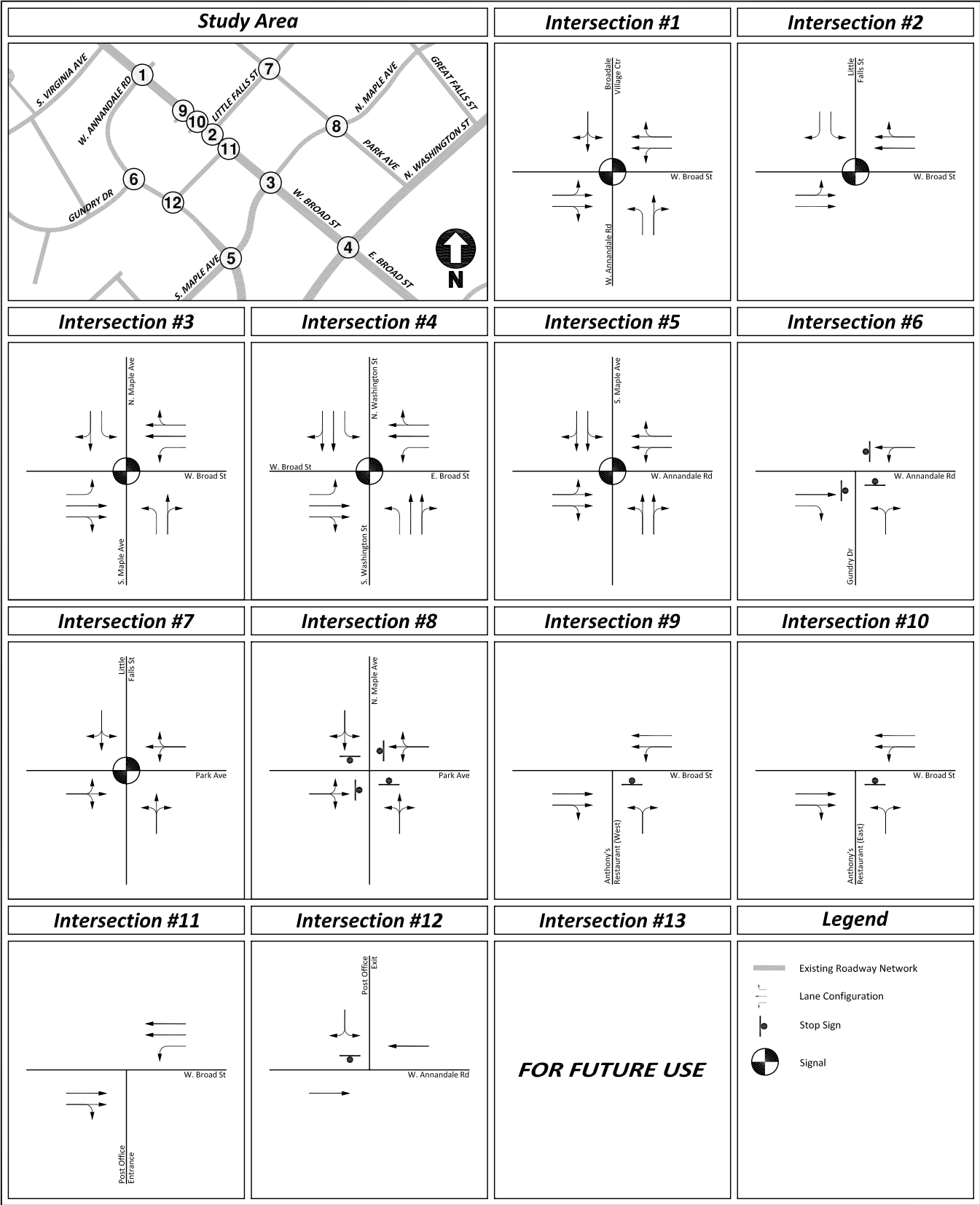


Figure 3: Existing (2012) Roadway Network

## Transit

Transit service to the study area is provided by Metrorail. The East Falls Church Metrorail station is located at the I-66/Sycamore Street interchange and operates on Metrorail's Orange Line and forthcoming Silver Line, phase 1 of which will be completed by the end of 2013. Orange Line trains run every three to four minutes during the morning and afternoon peak periods and every 12 to 20 minutes during the weekday off-peak periods and on weekends. From the station, it is approximately a 1.2 mile walk to the site's northern property line along W. Broad Street, or a 24-30 minute walk depending on walking speed.

The Washington Transit Metropolitan Authority (WMATA) Metrobus provides bus services to the study area. Table 1 shows a summary of the bus route information for the existing bus route lines that serve the site during weekdays with stops in the study area and Figure 4 illustrates the existing bus service. The nearest bus stops in relation to the 301 W. Broad Street property serving the 3B and 28A,X Metrobus lines are located in the northwest and southwest quadrants of the W. Broad Street and Little Falls Street intersection, right in front of the site. The nearest bus stops serving the 3A and 2A,B,C,G Metrobus lines are located at the E./W. Broad Street and N./S. Washington Street intersection, approximately a 0.20 mile walk from the site.

**Table 1: Weekday Bus Route Information**

Route Number	Route Name	Destination	Service Hours	Peak Period Headway
WMATA 2A,B,C,G	Washington Boulevard Line	Ballston, Merrifield, Fair Oaks Mall, Tysons Corner	Weekdays 4:48 am-12:56 am	15-30 min
WMATA 3A,B	Lee Highway Line	Annandale, West Falls Church Metro, Rosslyn	Weekdays 5:00 am-12:47 am	9-30 min
WMATA 28A	Leesburg Pike Line	Tysons Corner, King Street Metro	Weekdays 5:09 am-1:04 am	30 min
WMATA 28X	Leesburg Pike Limited Stop	Tysons Corner, Mark Center	Weekdays 5:30am-9:05am & 3:35pm-7:19pm	15-30 min





Figure 4: Existing Transit Service

## EXISTING CONDITIONS (2012)

### *Existing Traffic Volumes*

In order to determine the weekday and Saturday peak hour turning movement traffic volumes, traffic counts were conducted at the study intersections on Thursday, June 7; Tuesday, July 10; Tuesday, August 28; Saturday, June 2; Saturday July 14; and Saturday, August 25, 2012 during the weekday morning and afternoon peak periods, as well as the Saturday peak period. Per direction received from City of Falls Church staff, since two of the intersection counts (these were the two intersections along Park Avenue) occurred after the local area's public school year ended, the traffic counts at these two intersections were "balanced" upward using the traffic count data collected at the adjacent intersections during the school-year. Analysis of the traffic data found the following peak hours:

- AM Peak Hour: 7:45 AM to 8:45 AM
- PM Peak Hour: 5:00 PM to 6:00 PM
- Saturday Peak Hour: 11:30 AM to 12:30 PM

The existing balanced peak hour traffic volumes for the intersections contained within the study area are shown Figure 5. The existing counts are included in Appendix B.

### *Existing Conditions Capacity Analysis*

Intersection capacity analyses were performed for the existing conditions at the study area intersections during the weekday morning and afternoon peak hours, as well as the Saturday peak hour. *Synchro, version 7.0* was used to analyze the study intersections with results based on the Highway Capacity Manual (HCM) methodology. The existing peak hour factors (by approach) acquired from the traffic counts and restricted to within the range of 0.85 to 1.00, were used in the analysis along with the default heavy vehicle percentage of 2%. Synchro files were obtained from the City of Falls Church and the lane configurations and storage bay lengths were field-verified. Also, the following input data from the City's Synchro files were kept unchanged and held consistent throughout all studied scenarios: lane widths, road grades, and number of bus blockages per hour.

The results of the intersection capacity analyses are presented in Table 2, and are expressed in level of service (LOS) and delay (seconds per vehicle) per lane group. The intersections, approaches, and lane groups that operate at LOS E or F are shown in red. Lane groups where the queue length exceeds storage are also shown in red. The 95<sup>th</sup> and 50<sup>th</sup> percentile queue lengths are expressed in feet. The detailed analysis worksheets are contained in Appendix D.

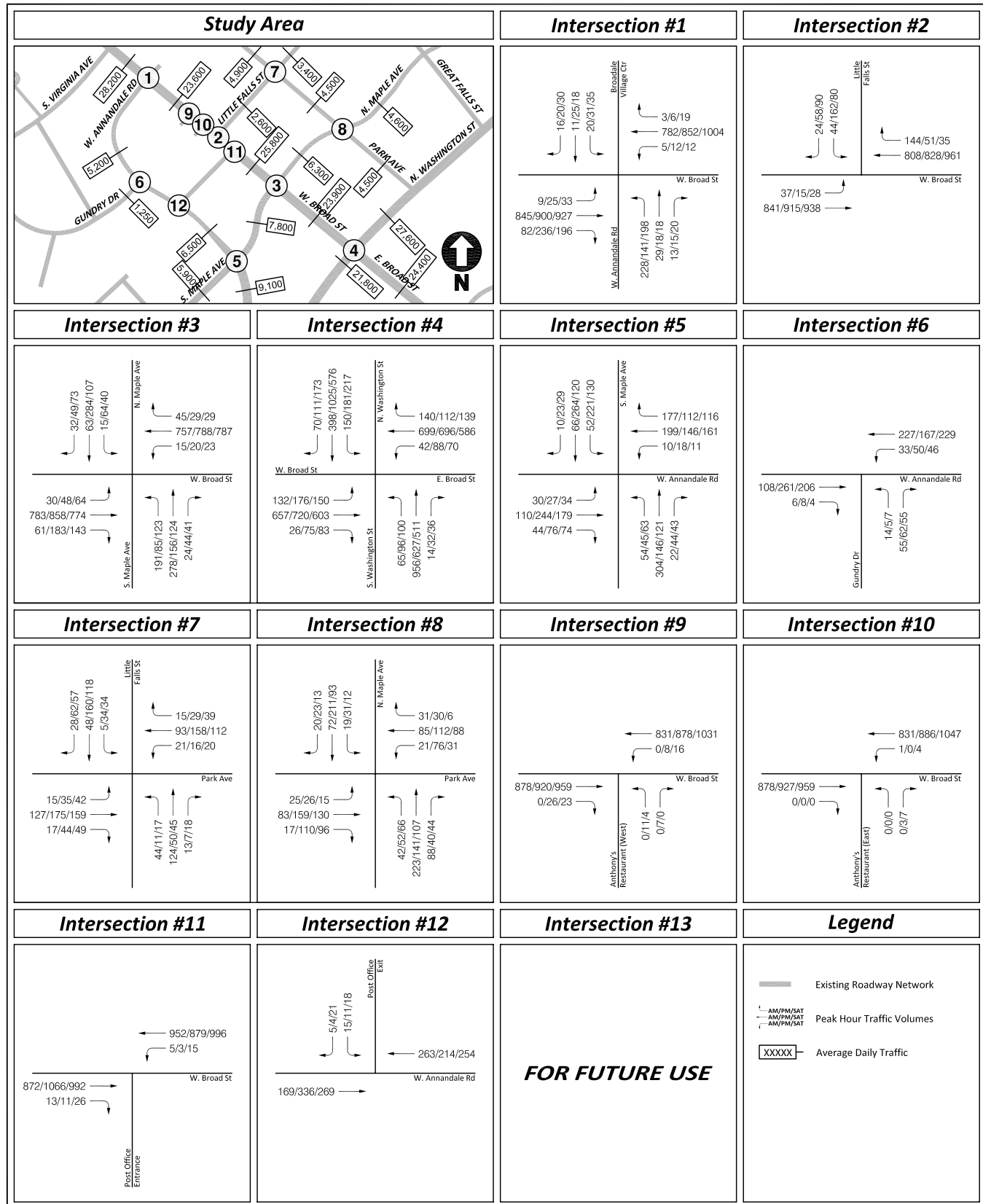


Figure 4: Existing (2012) Traffic Volumes

Table 2: Existing (2012) Intersection Capacity Analysis

No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak				SAT Peak			
			LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue
1	W. Broad St & W. Annandale Rd													
	<b>Overall Intersection (Signalized)</b>		<b>B</b>	<b>12.7</b>			<b>A</b>	<b>8.6</b>			<b>B</b>	<b>16.8</b>		
	Eastbound Approach	180	A	2.6	30	35	A	6.4	59	65	B	16.4	323	#510
	Westbound Approach	400	B	16.2	193	271	A	3.6	18	75	B	13.5	227	327
	Northbound Approach		C	30.9			C	29.8			C	24.7		
	Northbound Left	80	C	31.9	125	191	C	30.4	80	120	C	25.3	93	134
	Northbound Thru/Right	600	C	25.3	14	37	C	27.1	9	29	C	21.1	7	25
	Southbound Approach	250	D	41.7	21	54	D	42.7	42	83	D	37.4	35	76
2	W. Broad St & Little Falls St													
	<b>Overall Intersection (Signalized)</b>		<b>A</b>	<b>9.2</b>			<b>B</b>	<b>10.9</b>			<b>A</b>	<b>7.7</b>		
	Eastbound Approach	380	A	9.2	300	367	A	9.2	82	161	A	6.1	82	207
	Westbound Approach	335	A	6.8	88	121	B	10.1	137	m150	A	5.5	74	184
	Southbound Approach		D	39.0			C	21.5			C	29.0		
	Southbound Left	110	C	33.4	33	63	C	24.4	93	133	C	29.5	39	67
	Southbound Right	380	D	49.6	3	29	B	13.3	3	10	C	28.5	10	42
3	W. Broad St & N./S. Maple Ave													
	<b>Overall Intersection (Signalized)</b>		<b>B</b>	<b>13.9</b>			<b>C</b>	<b>27.3</b>			<b>C</b>	<b>23.1</b>		
	Eastbound Approach		A	7.9			B	10.3			C	21.8		
	Eastbound Left	160	A	7.2	2	m12	A	5.8	7	m14	B	14.0	16	47
	Eastbound Thru/Right	320	A	7.9	38	113	B	10.5	77	272	C	22.3	161	372
	Westbound Approach		A	5.1			C	28.6			C	24.0		
	Westbound Left	135	A	4.2	1	m2	C	26.7	9	m11	B	17.1	6	22
	Westbound Thru/Right	460	A	5.1	49	67	C	28.7	230	m272	C	24.2	183	326
	Northbound Approach		C	34.2			D	45.4			C	21.0		
	Northbound Left	370	C	26.7	132	202	D	43.8	57	#95	B	17.4	42	104
	Northbound Thru/Right	375	D	39.0	209	300	D	46.1	141	207	C	23.8	70	163
	Southbound Approach		D	36.3			E	58.0			C	27.8		
	Southbound Left	150	C	33.4	8	21	C	28.3	31	63	C	22.8	14	41
	Southbound Thru/Right	385	D	36.7	48	90	E	63.7	216	#380	C	29.0	81	181
4	E./W. Broad St & N./S. Washington St													
	<b>Overall Intersection (Signalized)</b>		<b>C</b>	<b>31.9</b>			<b>C</b>	<b>32.6</b>			<b>D</b>	<b>37.4</b>		
	Eastbound Approach		D	40.1			C	29.8			C	30.5		
	Eastbound Left	275	E	57.5	73	m#153	D	52.3	55	#192	C	23.0	65	141
	Eastbound Thru/Right	445	D	36.7	235	208	C	24.8	234	#276	C	32.1	226	381
	Westbound Approach		C	30.1			D	35.4			D	41.3		
	Westbound Left	255	B	13.0	8	m17	C	20.9	24	53	C	25.1	31	77
	Westbound Thru/Right	1775	C	30.9	268	#368	D	37.0	274	#381	D	42.8	292	487
	Northbound Approach		C	32.3			D	35.1			D	38.2		
	Northbound Left	345	B	19.7	18	m46	C	28.7	48	#83	C	28.3	47	108
	Northbound Thru/Right	820	C	33.1	185	#411	D	36.0	255	314	D	40.0	202	346
	Southbound Approach		C	22.9			C	31.3			D	39.3		
	Southbound Left	190	C	28.1	68	#134	C	25.0	45	118	C	28.3	108	219
	Southbound Thru/Right	375	C	21.3	126	167	C	32.3	153	#494	D	42.5	283	473
5	W. Annandale Rd & S. Maple Ave													
	<b>Overall Intersection (Signalized)</b>		<b>C</b>	<b>21.4</b>			<b>B</b>	<b>18.8</b>			<b>A</b>	<b>8.1</b>		
	Eastbound Approach	610	A	4.8	14	32	A	9.1	49	83	A	8.1	14	35
	Westbound Approach	505	A	4.7	3	96	A	1.9	0	9	A	8.0	11	31
	Northbound Approach	1115	D	40.4	130	168	C	27.8	57	81	A	8.1	13	30
	Southbound Approach	375	D	36.9	48	64	C	31.1	185	m196	A	8.3	16	38

No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak				SAT Peak			
			LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue
6	W. Annandale Rd & Gundry Dr													
	<b>Overall Intersection (Unsignalized)</b>		<b>A</b>	<b>9.0</b>			<b>A</b>	<b>9.5</b>			<b>A</b>	<b>9.4</b>		
	Eastbound Approach	615	A	8.1	n/a	n/a	A	9.9	n/a	n/a	A	9.2	n/a	n/a
	Westbound Approach	600	A	9.6	n/a	n/a	A	9.5	n/a	n/a	A	9.9	n/a	n/a
	Northbound Approach	1900	A	7.9	n/a	n/a	A	8.1	n/a	n/a	A	8.1	n/a	n/a
7	Park Ave & Little Falls St													
	<b>Overall Intersection (Signalized)</b>		<b>C</b>	<b>26.5</b>			<b>C</b>	<b>23.0</b>			<b>B</b>	<b>15.4</b>		
	Eastbound Approach	705	D	45.0	109	158	C	30.8	153	218	B	18.1	85	145
	Westbound Approach	400	D	42.7	86	131	C	28.6	117	172	B	16.0	48	92
	Northbound Approach	385	A	7.6	63	134	B	16.0	33	m69	B	11.5	18	40
	Southbound Approach	640	A	5.8	22	45	B	12.5	94	125	B	13.3	57	97
8	Park Ave & N. Maple Ave													
	<b>Overall Intersection (Unsignalized)</b>		<b>B</b>	<b>11.9</b>			<b>C</b>	<b>15.5</b>			<b>B</b>	<b>10.9</b>		
	Eastbound Approach	375	B	10.1	n/a	n/a	C	16.6	n/a	n/a	B	11.3	n/a	n/a
	Westbound Approach	390	B	10.2	n/a	n/a	B	14.4	n/a	n/a	B	10.1	n/a	n/a
	Northbound Approach	395	B	13.9	n/a	n/a	C	15.2	n/a	n/a	B	11.4	n/a	n/a
	Southbound Approach	530	A	9.6	n/a	n/a	C	15.5	n/a	n/a	A	9.9	n/a	n/a
9	W. Broad St & Anthony's Restaurant (West)													
	<b>Overall Intersection (Unsignalized)</b>													
	Westbound Left/Thru	150	A	0.0	n/a	0	A	0.3	n/a	1	A	0.6	n/a	1
	Northbound Approach	125	A	8.9	n/a	0	B	11.2	n/a	3	B	14.7	n/a	1
10	W. Broad St & Anthony's Restaurant (East)													
	<b>Overall Intersection (Unsignalized)</b>													
	Westbound Left/Thru	50	A	0.0	n/a	0	A	0.0	n/a	0	A	0.2	n/a	0
	Northbound Approach	120	A	8.9	n/a	0	A	8.9	n/a	0	A	9.2	n/a	1
11	W. Broad St & Post Office Entrance													
	<b>Overall Intersection (Unsignalized)</b>													
	Westbound Left	75	A	9.1	n/a	0	A	9.9	n/a	0	A	9.8	n/a	2
12	W. Annandale Rd & Post Office Exit													
	<b>Overall Intersection (Unsignalized)</b>													
	Southbound Approach	360	B	11.1	n/a	3	B	11.7	n/a	2	B	11.3	n/a	6

Notes: N/A – Not Applicable

# – 95th percentile volume exceeds capacity, queue may be longer. Queue shown is the maximum after two cycles.

m – Volume for 95<sup>th</sup> percentile queue is metered by upstream signal.

~ – Volume exceeds capacity, queue can be longer. Queue shown is maximum after two cycles.

For the purpose of this analysis, it is desirable to achieve a LOS D or better for each approach of an intersection. If an acceptable level of service cannot be achieved, then it is desirable for the future with development conditions to be no worse than the network without the new development. A description of the various levels of service is included in Appendix C. All of the study intersections' approaches currently operate at acceptable levels of service during the weekday morning, afternoon, and Saturday peak hours with the exception of the southbound S. Maple Avenue approach at the W. Broad Street and N./S. Maple Avenue intersection during the weekday PM peak hour only.

Based on the queuing analysis, peak hour queue lengths currently exceed the storage lengths in one or more of the lane groups at the following intersections during one or more of the peak periods:

- W. Broad Street and W. Annandale Road

- W. Broad Street and Little Falls Street (PM only)
- W. Broad Street and N./S. Maple Avenue (Saturday only)
- E./W. Broad Street and N./S. Washington Street (PM and Saturday only)

As there are currently no road improvements being constructed at the study intersections, there was no mitigation assumed in the analysis moving forward into the future without development analysis. The results of the intersection capacity analyses for the existing conditions are shown in Figure 6.



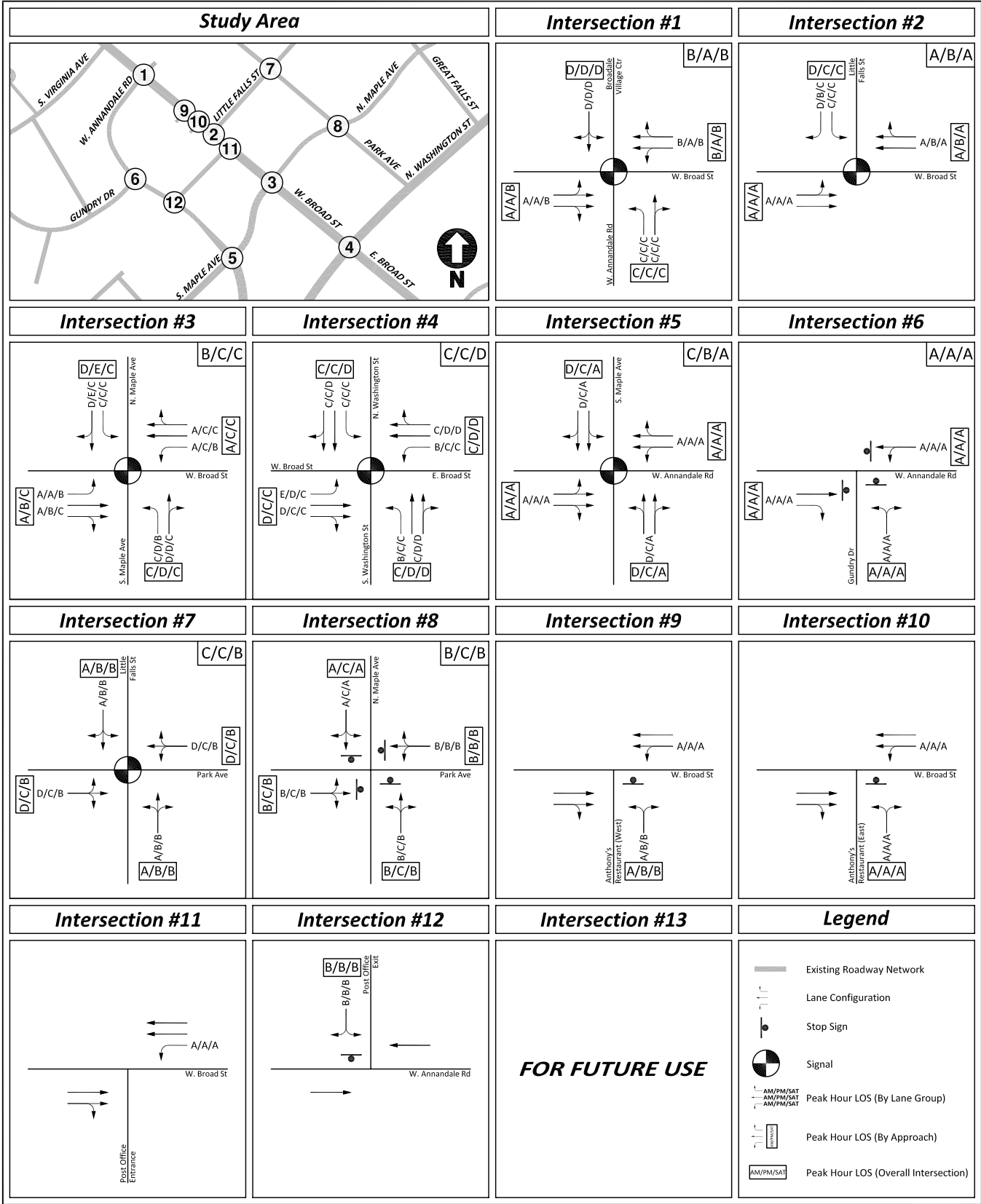


Figure 6: Existing (2012) Levels of Service

## **FUTURE CONDITIONS WITHOUT DEVELOPMENT (2016)**

### ***Future without Development Traffic Volumes***

The proposed 301 W. Broad Street redevelopment is anticipated to be complete in 2016. As agreed upon at the scoping meeting, an inherent growth rate of 1.0% compounded annually over a four-year period, totaling 4.06% growth of the existing volumes, was applied on major roadways and movements to account for regional growth within the development area.

There were no nearby approved background developments scheduled to be built prior to the site's 2016 buildout year identified during the scoping meeting for inclusion in the study. Additionally, there are no planned funded road improvements within the study area.

The inherent growth was applied to the existing volumes to project the future conditions without the proposed development as illustrated in Figure 7.

### ***Future without Development Capacity Analysis***

Intersection capacity analyses were performed for the future conditions without the proposed development at the intersections contained within the study area during the weekday morning and afternoon peak hours, as well as the Saturday peak hour. *Synchro*, version 7.0 was used to analyze the study intersections with results based on the Highway Capacity Manual (HCM) methodology. The default peak hour factor of 1.00 has been used in the analysis. Heavy vehicle percentages, lane widths, road grades, and number of bus blockages per hour were kept the same as the existing conditions. The capacity and queuing analysis results are shown in Table 3. The detailed analysis worksheets are contained in Appendix E.



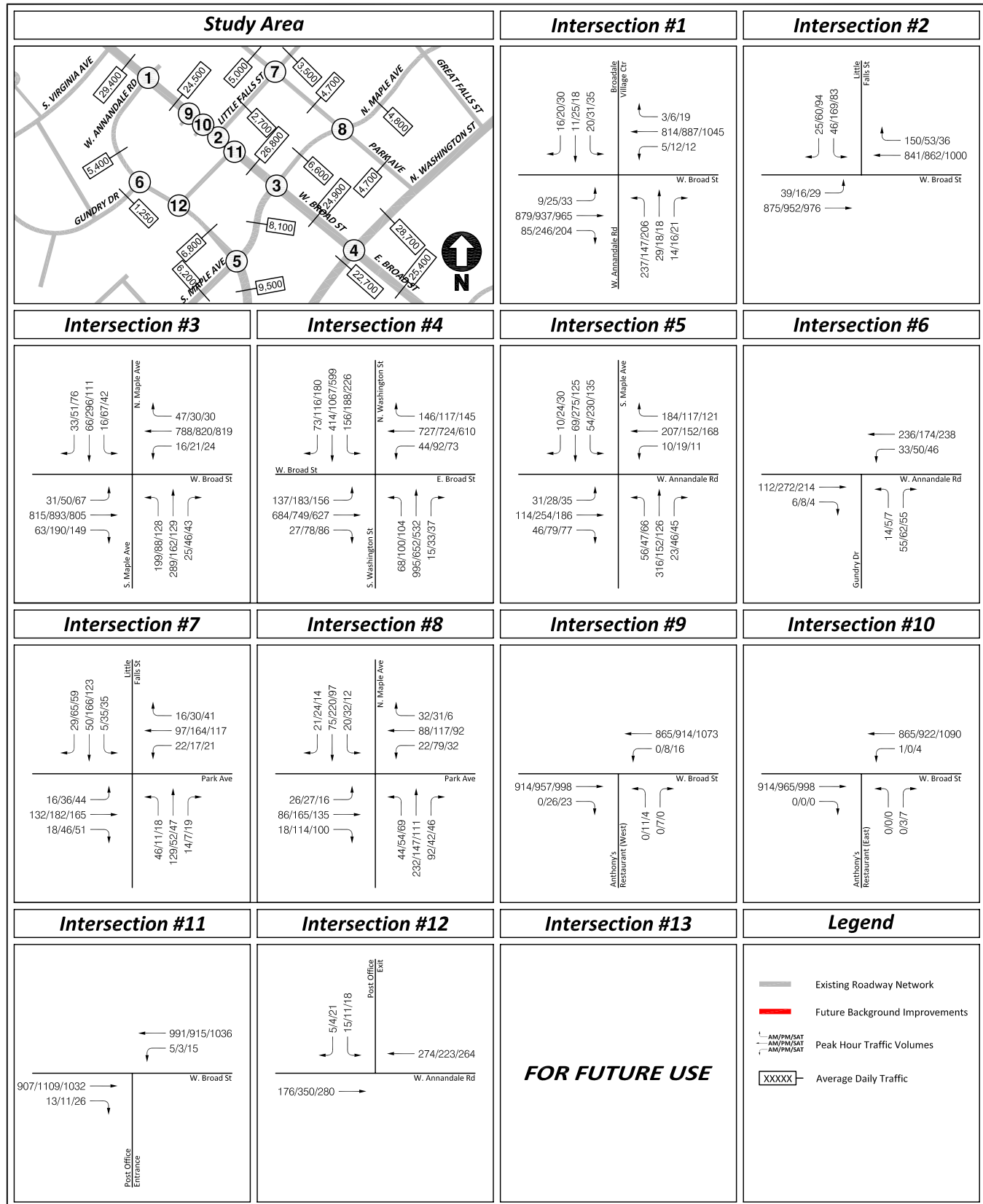


Figure 7: Future without Development (2016) Traffic Volumes

Table 3: Future without Development (2016) Intersection Capacity Analysis

No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak				SAT Peak			
			LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue
1	W. Broad St & W. Annandale Rd													
	<b>Overall Intersection (Signalized)</b>		<b>B</b>	<b>12.2</b>			<b>A</b>	<b>7.2</b>			<b>B</b>	<b>15.0</b>		
	Eastbound Approach	180	A	2.4	27	33	A	4.6	51	61	B	13.5	279	#406
	Westbound Approach	400	B	16.0	191	266	A	3.1	15	67	B	12.8	223	320
	Northbound Approach		C	30.1			C	29.9			C	24.7		
	Northbound Left	80	C	30.9	114	179	C	30.5	71	116	C	25.2	83	131
	Northbound Thru/Right	600	C	25.7	12	35	C	27.6	8	29	C	21.8	6	25
	Southbound Approach	250	D	41.5	17	51	D	42.3	35	78	D	37.0	27	69
2	W. Broad St & Little Falls St													
	<b>Overall Intersection (Signalized)</b>		<b>A</b>	<b>8.3</b>			<b>B</b>	<b>10.6</b>			<b>A</b>	<b>7.6</b>		
	Eastbound Approach	380	A	7.6	268	348	A	7.8	77	121	A	5.9	76	195
	Westbound Approach	335	A	6.8	82	114	B	10.8	126	m138	A	5.5	75	188
	Southbound Approach		D	39.6			C	22.0			C	29.0		
	Southbound Left	110	C	33.9	29	60	C	24.2	96	138	C	29.5	38	64
	Southbound Right	380	D	50.2	8	28	B	15.7	3	11	C	28.6	10	42
3	W. Broad St & N./S. Maple Ave													
	<b>Overall Intersection (Signalized)</b>		<b>B</b>	<b>13.1</b>			<b>C</b>	<b>25.6</b>			<b>C</b>	<b>22.0</b>		
	Eastbound Approach		A	4.9			A	8.2			C	20.4		
	Eastbound Left	160	A	4.3	1	m8	A	5.0	6	m13	B	13.3	15	44
	Eastbound Thru/Right	320	A	4.9	17	66	A	8.4	63	84	C	20.9	145	340
	Westbound Approach		A	4.7			C	26.8			C	23.0		
	Westbound Left	135	A	3.8	1	m2	C	25.7	8	m11	B	16.1	5	21
	Westbound Thru/Right	460	A	4.7	45	m61	C	26.8	214	m267	C	23.2	176	311
	Northbound Approach		D	36.2			D	45.5			C	20.8		
	Northbound Left	370	C	27.7	132	202	D	42.2	51	90	B	17.2	38	97
	Northbound Thru/Right	375	D	41.6	209	299	D	46.9	122	197	C	23.5	63	150
	Southbound Approach		D	37.9			E	56.6			C	27.0		
	Southbound Left	150	D	35.1	7	20	C	28.5	30	61	C	22.6	12	40
	Southbound Thru/Right	385	D	38.3	44	85	E	62.0	208	#362	C	28.0	68	168
4	E./W. Broad St & N./S. Washington St													
	<b>Overall Intersection (Signalized)</b>		<b>C</b>	<b>33.2</b>			<b>C</b>	<b>31.8</b>			<b>D</b>	<b>36.1</b>		
	Eastbound Approach		D	43.3			C	27.3			C	30.3		
	Eastbound Left	275	E	60.8	76	m#148	D	47.4	54	#174	C	21.9	64	139
	Eastbound Thru/Right	445	D	39.9	220	228	C	22.8	207	282	C	32.1	223	375
	Westbound Approach		C	31.8			C	31.6			D	39.7		
	Westbound Left	255	B	12.9	9	m18	B	16.2	24	42	C	24.9	29	72
	Westbound Thru/Right	1775	C	32.7	278	#388	C	33.3	277	#386	D	41.2	263	443
	Northbound Approach		C	32.7			C	34.9			D	36.8		
	Northbound Left	345	B	19.6	18	m47	C	31.7	45	#69	C	27.2	44	103
	Northbound Thru/Right	820	C	33.6	188	#418	D	35.4	233	295	D	38.5	191	331
	Southbound Approach		C	22.7			C	33.4			D	37.8		
	Southbound Left	190	C	27.6	66	130	C	22.5	39	114	C	26.8	103	211
	Southbound Thru/Right	375	C	21.2	123	163	D	35.1	166	#511	D	41.0	271	455
5	W. Annandale Rd & S. Maple Ave													
	<b>Overall Intersection (Signalized)</b>		<b>C</b>	<b>21.3</b>			<b>B</b>	<b>19.0</b>			<b>A</b>	<b>8.0</b>		
	Eastbound Approach	610	A	4.4	12	27	A	8.1	40	74	A	8.1	13	33
	Westbound Approach	505	A	3.4	0	62	A	1.5	0	7	A	8.0	10	30
	Northbound Approach	1115	D	41.4	122	161	C	29.0	55	80	A	7.9	11	27
	Southbound Approach	375	D	40.3	43	66	C	31.3	172	m188	A	8.2	16	36

No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak				SAT Peak			
			LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue
6	W. Annandale Rd & Gundry Dr													
	<b>Overall Intersection (Unsignalized)</b>		<b>A</b>	<b>8.7</b>			<b>A</b>	<b>9.1</b>			<b>A</b>	<b>9.1</b>		
	Eastbound Approach	615	A	8.0	n/a	n/a	A	9.3	n/a	n/a	A	8.9	n/a	n/a
	Westbound Approach	600	A	9.2	n/a	n/a	A	9.1	n/a	n/a	A	9.6	n/a	n/a
	Northbound Approach	1900	A	7.7	n/a	n/a	A	7.9	n/a	n/a	A	7.9	n/a	n/a
7	Park Ave & Little Falls St													
	<b>Overall Intersection (Signalized)</b>		<b>C</b>	<b>26.1</b>			<b>C</b>	<b>22.3</b>			<b>B</b>	<b>15.1</b>		
	Eastbound Approach	705	D	45.0	96	154	C	29.6	131	211	B	17.6	76	135
	Westbound Approach	400	D	42.6	76	128	C	28.2	101	167	B	15.9	46	89
	Northbound Approach	385	A	6.9	55	122	B	15.3	32	m62	B	11.4	16	39
	Southbound Approach	640	A	5.0	18	40	B	12.1	83	114	B	12.9	49	92
8	Park Ave & N. Maple Ave													
	<b>Overall Intersection (Unsignalized)</b>		<b>B</b>	<b>10.7</b>			<b>B</b>	<b>13.8</b>			<b>A</b>	<b>10.0</b>		
	Eastbound Approach	375	A	9.6	n/a	n/a	B	14.4	n/a	n/a	B	10.2	n/a	n/a
	Westbound Approach	390	A	9.6	n/a	n/a	B	13.1	n/a	n/a	A	9.4	n/a	n/a
	Northbound Approach	395	B	12.0	n/a	n/a	B	13.3	n/a	n/a	B	10.3	n/a	n/a
	Southbound Approach	530	A	9.1	n/a	n/a	B	14.2	n/a	n/a	A	9.3	n/a	n/a
9	W. Broad St & Anthony's Restaurant (West)													
	<b>Overall Intersection (Unsignalized)</b>													
	Westbound Left/Thru	150	A	0.0	n/a	0	A	0.3	n/a	1	A	0.6	n/a	1
	Northbound Approach	125	A	9.0	n/a	0	B	11.9	n/a	3	C	15.8	n/a	1
10	W. Broad St & Anthony's Restaurant (East)													
	<b>Overall Intersection (Unsignalized)</b>													
	Westbound Left/Thru	50	A	0.0	n/a	0	A	0.0	n/a	0	A	0.2	n/a	0
	Northbound Approach	120	A	9.0	n/a	0	A	9.0	n/a	0	A	9.2	n/a	1
11	W. Broad St & Post Office Entrance													
	<b>Overall Intersection (Unsignalized)</b>													
	Westbound Left	75	A	9.3	n/a	0	B	10.1	n/a	0	B	10.0	n/a	2
12	W. Annandale Rd & Post Office Exit													
	<b>Overall Intersection (Unsignalized)</b>													
	Southbound Approach	360	B	11.2	n/a	3	B	11.9	n/a	2	B	11.3	n/a	5

Notes: N/A – Not Applicable

# – 95th percentile volume exceeds capacity, queue may be longer. Queue shown is the maximum after two cycles.

m – Volume for 95th percentile queue is metered by upstream signal.

~ – Volume exceeds capacity, queue can be longer. Queue shown is maximum after two cycles.

As mentioned previously, it is desirable to achieve a LOS D or better per approach. If an acceptable level of service cannot be achieved, then it is desirable for the future with development conditions to be no worse than the network without the new development. Just like the existing conditions, all of the study intersections' approaches will continue to operate at acceptable levels of service during the weekday morning, afternoon, and Saturday peak hours with the exception of the southbound S. Maple Avenue approach at the W. Broad Street and N./S. Maple Avenue intersection during the weekday PM peak hour only.

Based on the queuing analysis, peak hour queue lengths will continue to exceed the storage length in one or more of the lane groups at the following intersections during one or more of the peak periods:

- W. Broad Street and W. Annandale Road

- W. Broad Street and Little Falls Street (PM only)
- W. Broad Street and N./S. Maple Avenue (Saturday only)
- E./W. Broad Street and N./S. Washington Street (PM and Saturday only)

The minimal improvements that occurred in the delay results at several of the study intersections' approaches and lane groups, when compared to the delay results of the existing conditions, is attributed to the use of existing peak hour factors (by approach) in the existing conditions; whereas the default peak hour factor of 1.00 was used in both future scenarios. The use of the peak hour factor in this way was agreed upon in the scoping document and is standard industry practice.

As there are currently no road improvements being funded or planned at the study intersections by 2016, there was no mitigation assumed in the analysis moving forward into the future with development analysis. The results of the intersection capacity analyses for the future without development conditions are shown in Figure 8.

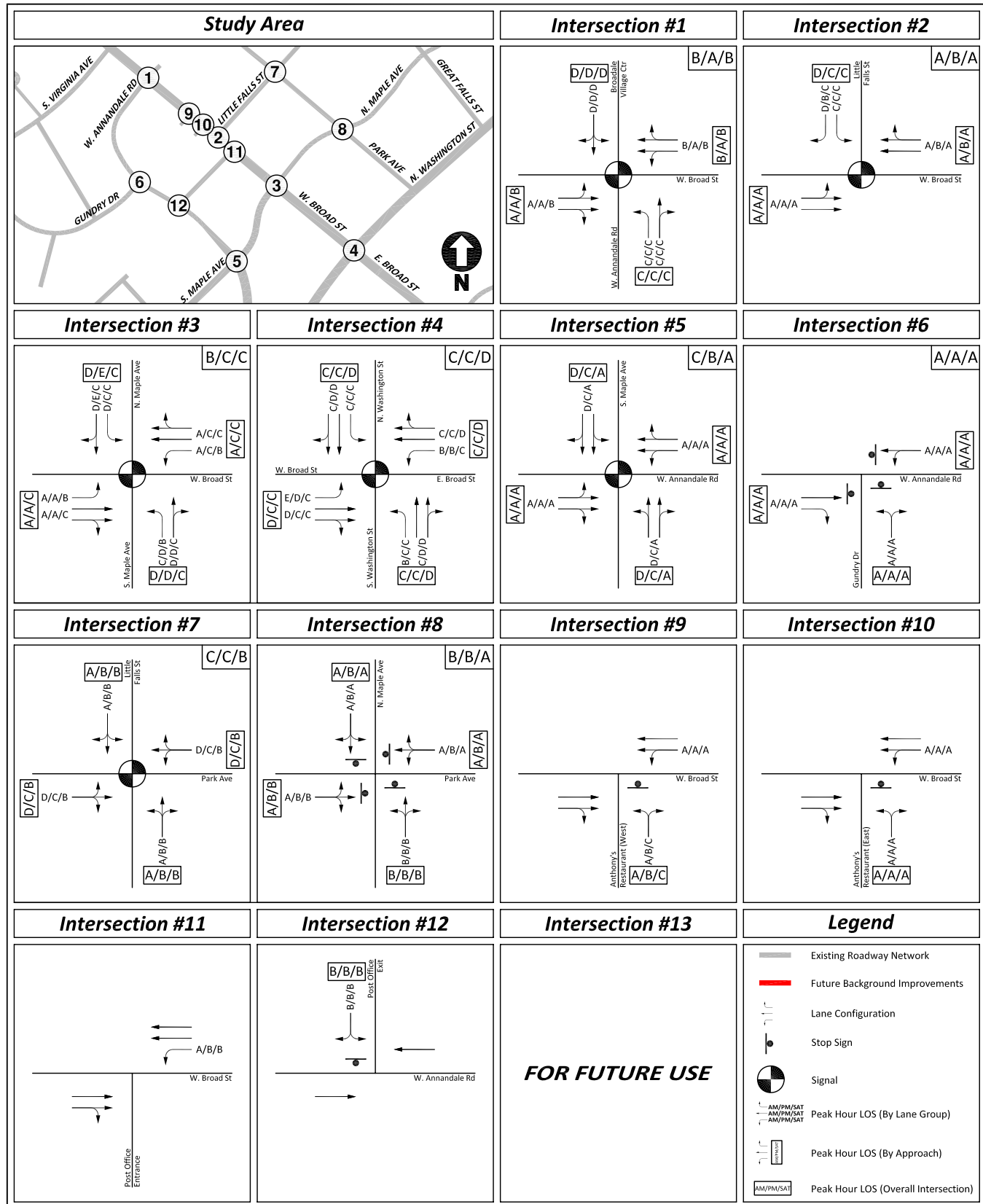


Figure 8: Future without Development (2016) Levels of Service

## TRIP GENERATION

The proposed redevelopment is planned to consist of one multi-use building featuring a 60,000 square foot supermarket, 282 apartments, and 3,470 square feet of ground floor retail. This study evaluated the proposed development assuming a 60,883 square foot supermarket, 294 apartments, and 4,011 square feet of ground floor retail, all of which are slightly larger than their currently proposed areas, in order to allow for flexibility in the event there are any minor adjustments to the final development plan floor area calculations.

In order to calculate the trip generation for the proposed redevelopment, the Institute of Transportation Engineers' (ITE's) Trip Generation, 8<sup>th</sup> Edition was used to determine the trips into and out of the subject study site for the weekday morning, afternoon, and Saturday peak hours, as well as the typical weekday daily and Saturday (24-hour) trips to the site. The trips generated by the site's existing uses were calculated by counting the weekday and Saturday peak hour turning movements entering and exiting the site's existing four site accesses. These existing site trips were routed out of the network based on existing travel patterns and the proposed site's direction of approach as shown in Figure 9. To account for the synergy between the residential and retail land uses, a 5%, 10%, 15%, 10% internal capture reduction was applied to the weekday AM, PM, Daily, and Saturday site generated trips, respectively, as allowed per VDOT Chapter 870 guidelines. This reduction was calculated based on the site's residential trips because it is lesser of the two land uses. As agreed upon at the scoping meeting with City of Falls Church staff and as allowed per VDOT Chapter 870 guidelines, 36% of the new retail trips generated were assumed to be pass-by trips in order to recognize drivers already on the adjacent streets that will enter from the existing stream of traffic, and then continue in their original path after exiting the site. This rate represents the average pass-by trip percentage for the supermarket land use according to the ITE Trip Generation Handbook, 2<sup>nd</sup> Edition. The proposed 301 W. Broad Street redevelopment's trip generation is shown in Table 4.

**Table 4: Site Trip Generation**

Land Use	ITE Code	Size	----- Week day -----									----- Saturday -----			
			AM Peak Hour			PM Peak Hour			Daily	SAT Peak Hour			Daily		
			In	Out	Total	In	Out	Total	Total	In	Out	Total	Total		
<b>Proposed Residential</b>															
Apartment	220	294	DU	30	118	148	116	63	179	1,905	83	70	153	2,052	
Internal Trips Reduction (Residential)															
- 5% (AM), 10% (PM & SAT), 15% (Weekday Daily)	5%	10%	15%	-2	-6	-8	-12	-6	-18	-286	-8	-7	-15	-205	
Total Residential External Trips				28	112	140	104	57	161	1,619	75	63	138	1,847	
<b>Proposed Retail</b>															
Supermarket	850	60.883	kSF	134	85	219	325	312	637	6,225	337	324	661	10,812	
Specialty Retail Center	814	4.011	kSF	2	2	4	14	17	31	209	11	9	20	169	
Subtotal (Retail without reductions)				136	87	223	339	329	668	6,434	348	333	681	10,981	
Internal Trips Reduction (Retail)				-6	-2	-8	-6	-12	-18	-286	-7	-8	-15	-205	
Subtotal (Retail with internal reduction)				130	85	215	333	317	650	6,148	341	325	666	10,776	
Pass by Trips Reduction - 36% (Retail Only)				36%	-47	-31	-78	-120	-114	-234	-2,213	-123	-117	-240	-3,879
Total Retail External Trips				83	54	137	213	203	416	3,935	218	208	426	6,897	
Total Site External Trips				111	166	277	317	260	577	5,554	293	271	564	8,744	
<b>Existing Counts</b>															
United States Post Office	n/a	26.298	kSF	18	20	38	14	15	29	282 <sup>1</sup>	35	36	71	588 <sup>2</sup>	
High Turnover Sit-Down Restaurant	n/a	6.0	kSF	1	0	1	34	21	55	627 <sup>1</sup>	43	11	54	608 <sup>2</sup>	
Total External Trips - Existing				19	20	39	48	36	84	909	78	47	125	1,196	
Overall Total Net New External Trips				92	146	238	269	224	493	4,645	215	224	439	7,548	

Note: 1 – Calculated based on the relationship between ITE's published PM peak hour and weekday daily trip generation rates.  
2 – Calculated based on the relationship between ITE's published Saturday peak hour and Saturday daily trip generation rates.

The proposed redevelopment will generate approximately 238 new trips during the weekday morning peak hour, 493 new trips during the weekday afternoon peak hour, 439 new trips during the Saturday peak hour, and 4,645 new weekday daily trips.

## **SITE TRAFFIC DISTRIBUTION AND ASSIGNMENT**

### ***Site Access***

The following four intersections provide access to the subject property:

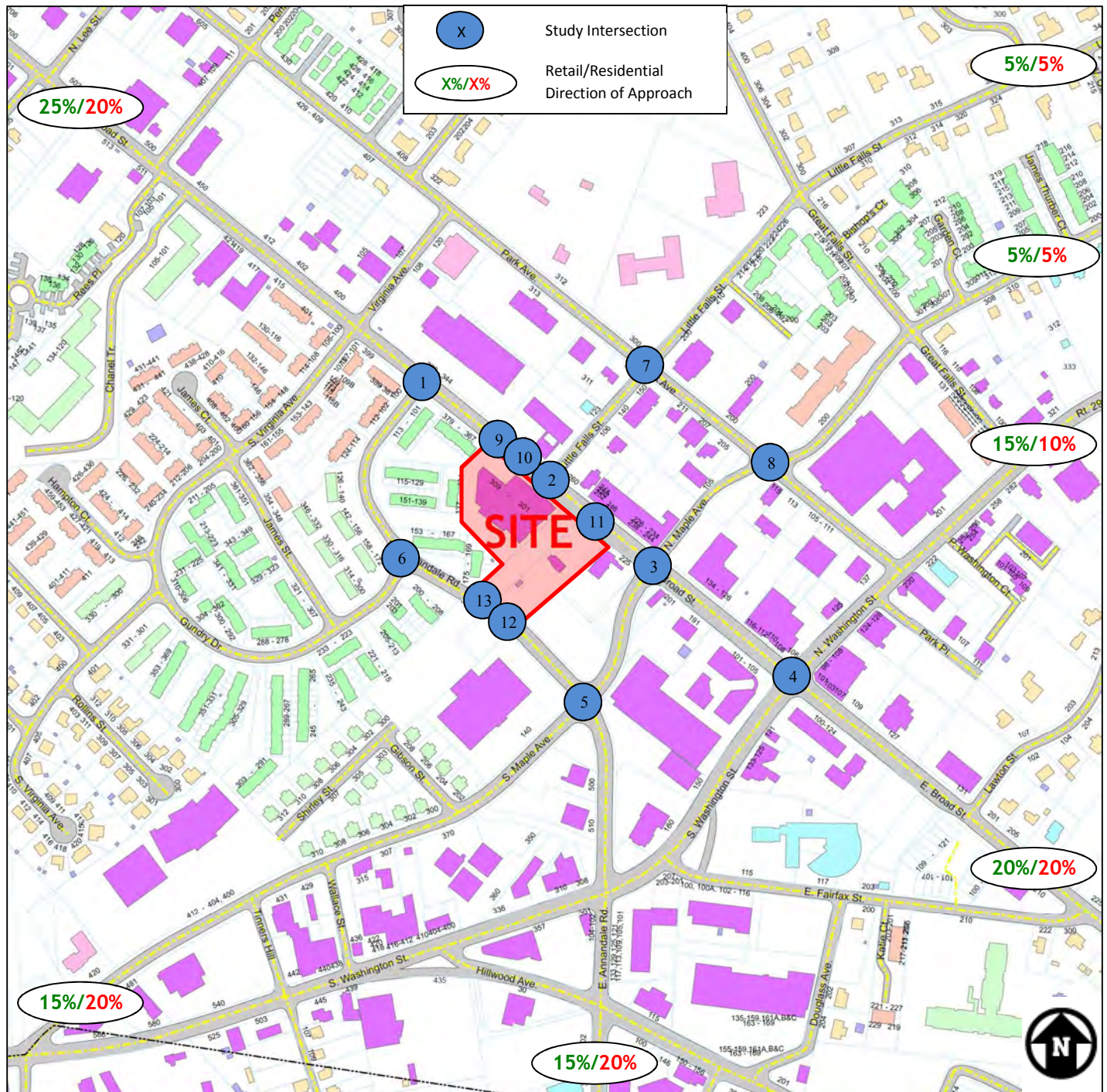
- W. Broad Street and Future Loading Access Intersection
- W. Broad Street and Retail Access
- W. Annandale and Residential Access
- W. Annandale and Retail Access

Access to the proposed development will be provided via two partial-access entrances along W. Broad Street, the westernmost of which will be a one-way right-out only access used exclusively for loading operations, trash collection, and service vehicle access. The easternmost W. Broad Street entrance is primarily used by the site generated retail trips, though it can also be used by a small percentage of residential trips, so almost all residential trips will use the Annandale Road entrance providing access to the two exclusively residential levels of the parking garage. There are two full-access site entrances proposed along W. Annandale Road, one providing access to the retail level of the parking garage while the other entrance provides access to the residential levels of the garage. The commercial parking on P1 is not connected to the two residential levels on P2 and P3 below without accessing the external road network. This access arrangement is a result of the site's layout and topography limitations.

### ***Distribution and Assignment***

The distribution of site trips was based on previous studies performed in the area, existing traffic patterns, and the nature of the proposed development. Trips generated from the site were assigned based on the abovementioned factors. The inbound and outbound trips calculated for the weekday morning, afternoon, and Saturday peak hours were routed in the roadway network to the site. The site direction of approach and trip distribution for the weekday and Saturday peak hours is illustrated in Figure 9. The site traffic assignment for the weekday and Saturday peak hours and average weekday 24-hour daily trips is illustrated in Figure 10 for the site's residential trips and Figure 11 for the site's retail trips, while the additional pass-by traffic is shown in Figure 12. The existing site trips were removed based on the existing traffic counts and the site's trip distribution as shown in Figure 13. Lastly, during the traffic counts conducted at the existing site entrances for the purpose of recording the existing trips generated by the site, three vehicles were counted cutting through the one-way U.S. Post Office access during the Saturday peak hour only. These vehicles were rerouted through the future roadway network as shown in Figure 14 since this driveway will be removed as part of the development plan. No vehicles were observed cutting through this access during the weekday morning and afternoon peak hours.





### Figure 9: Direction of Approach



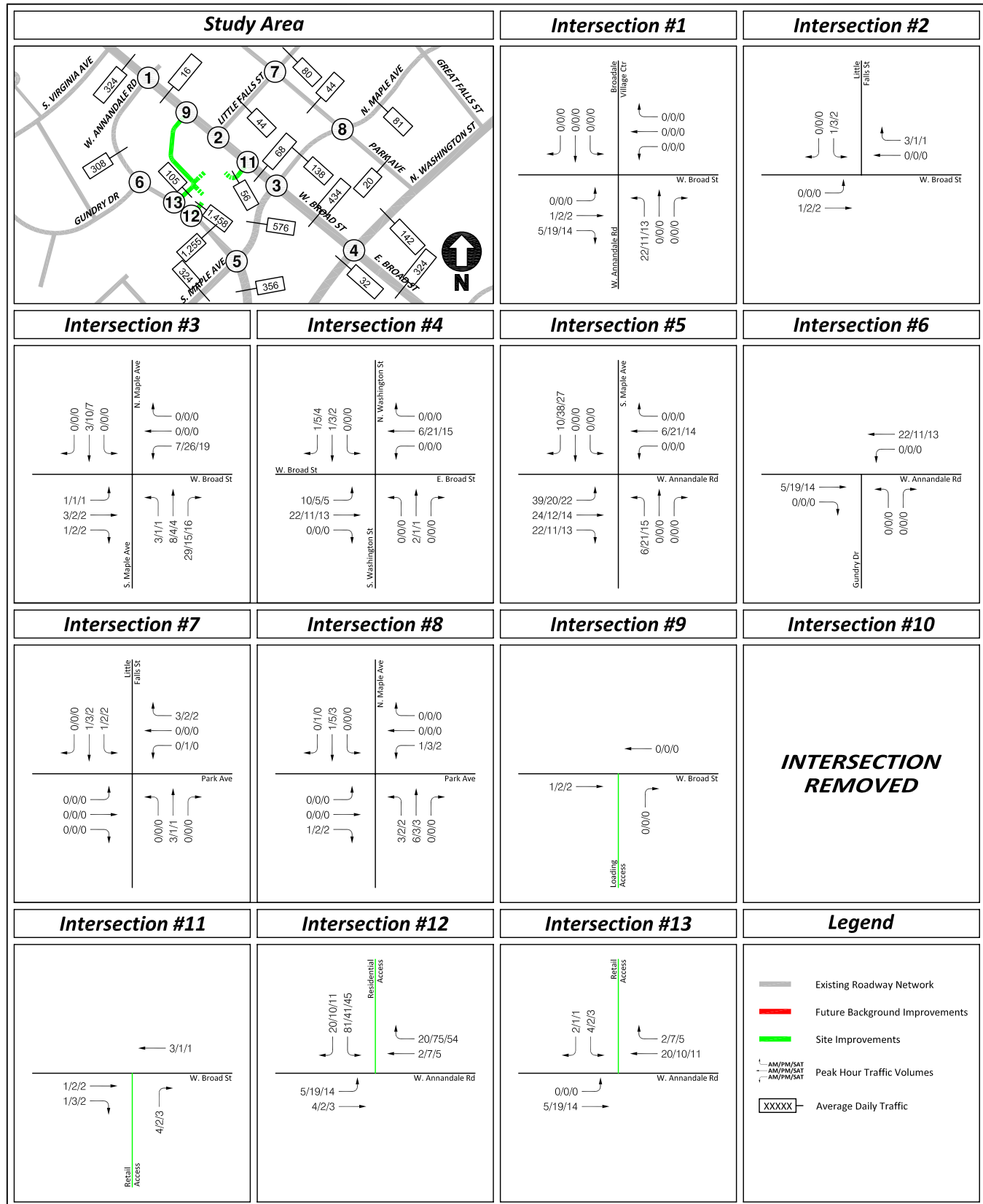


Figure 10: Site Generated Residential Trips

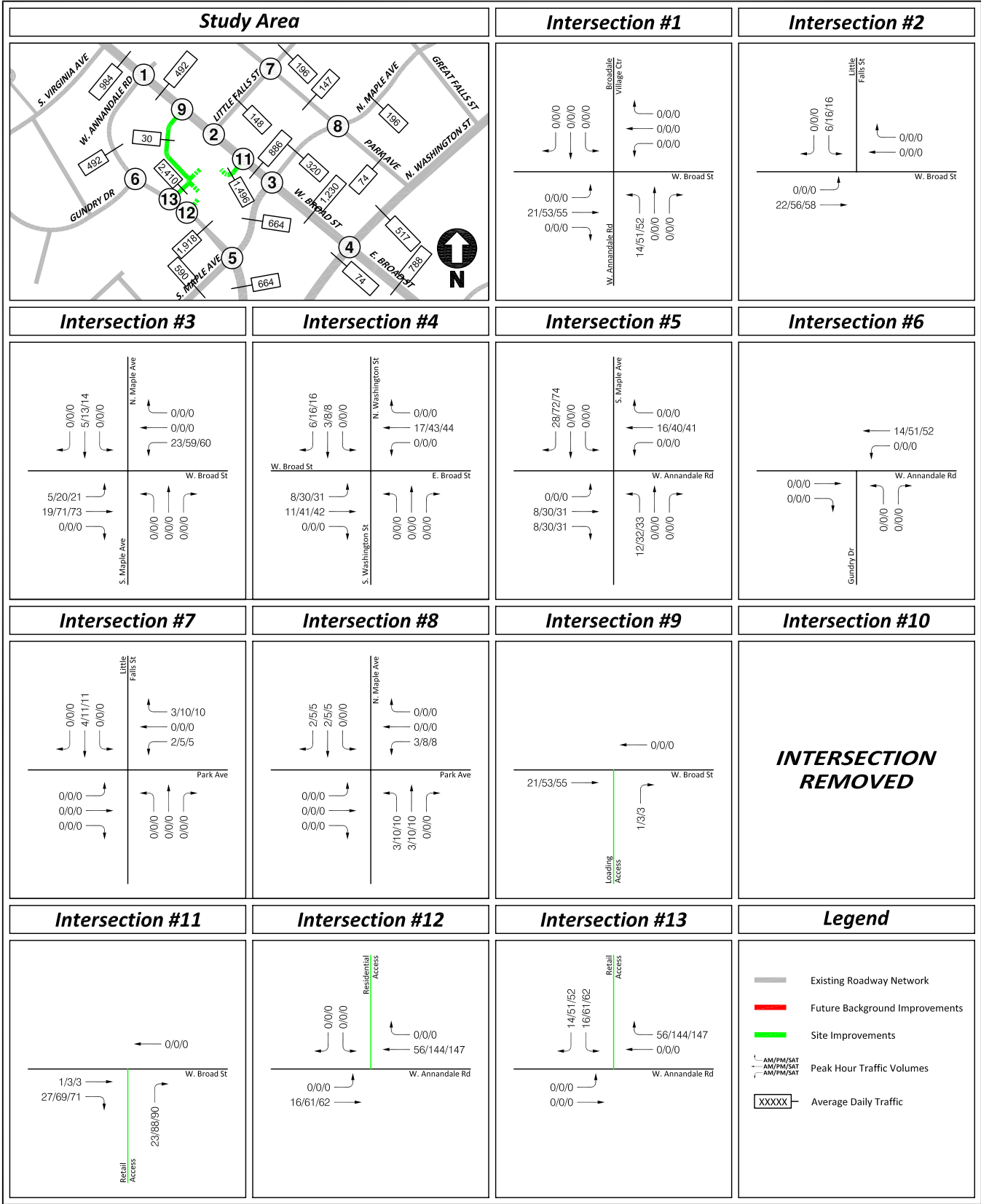


Figure 11: Site Generated Retail Trips

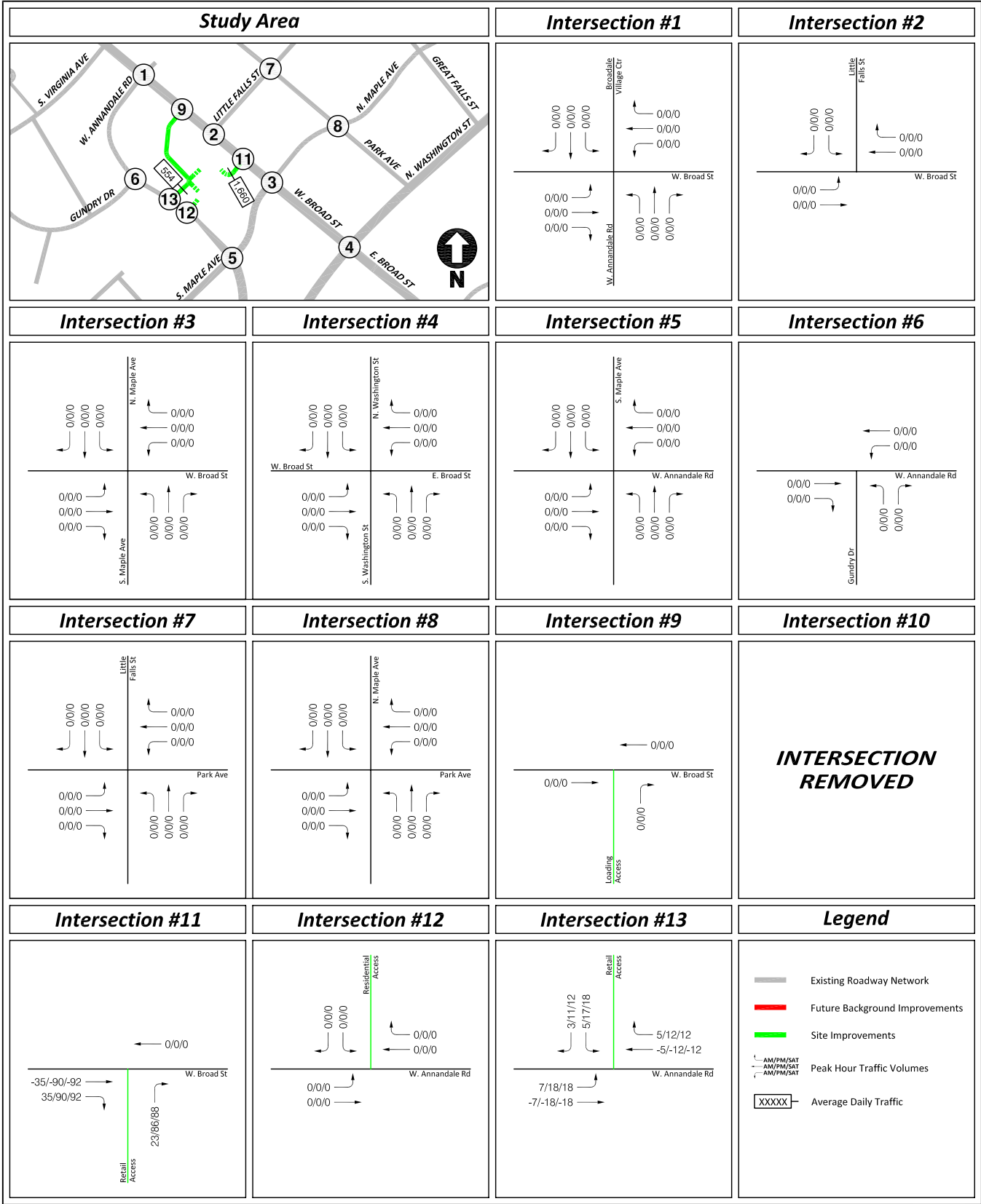


Figure 12: Pass-by Trips

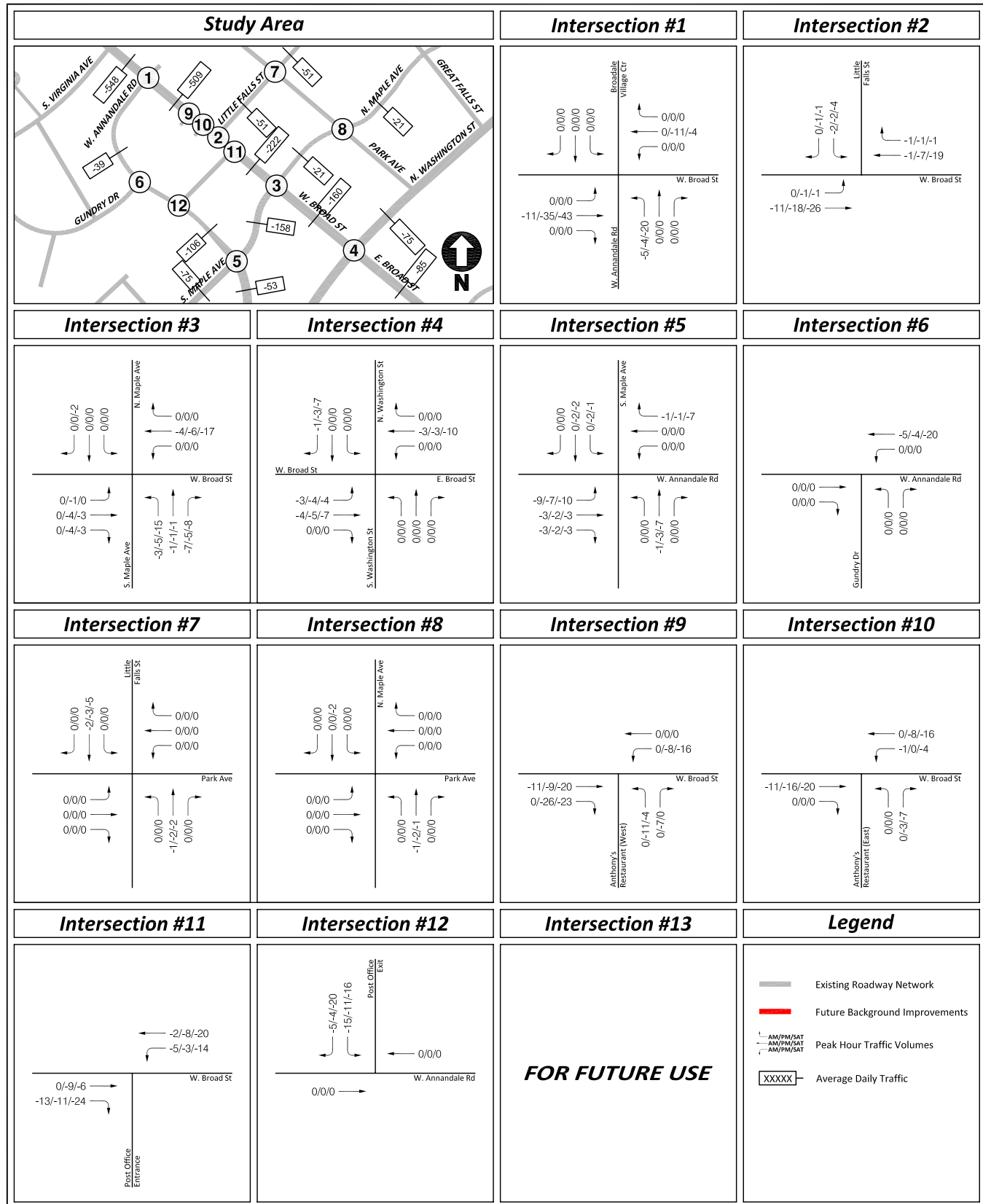


Figure 13: Existing Site Trips Removed

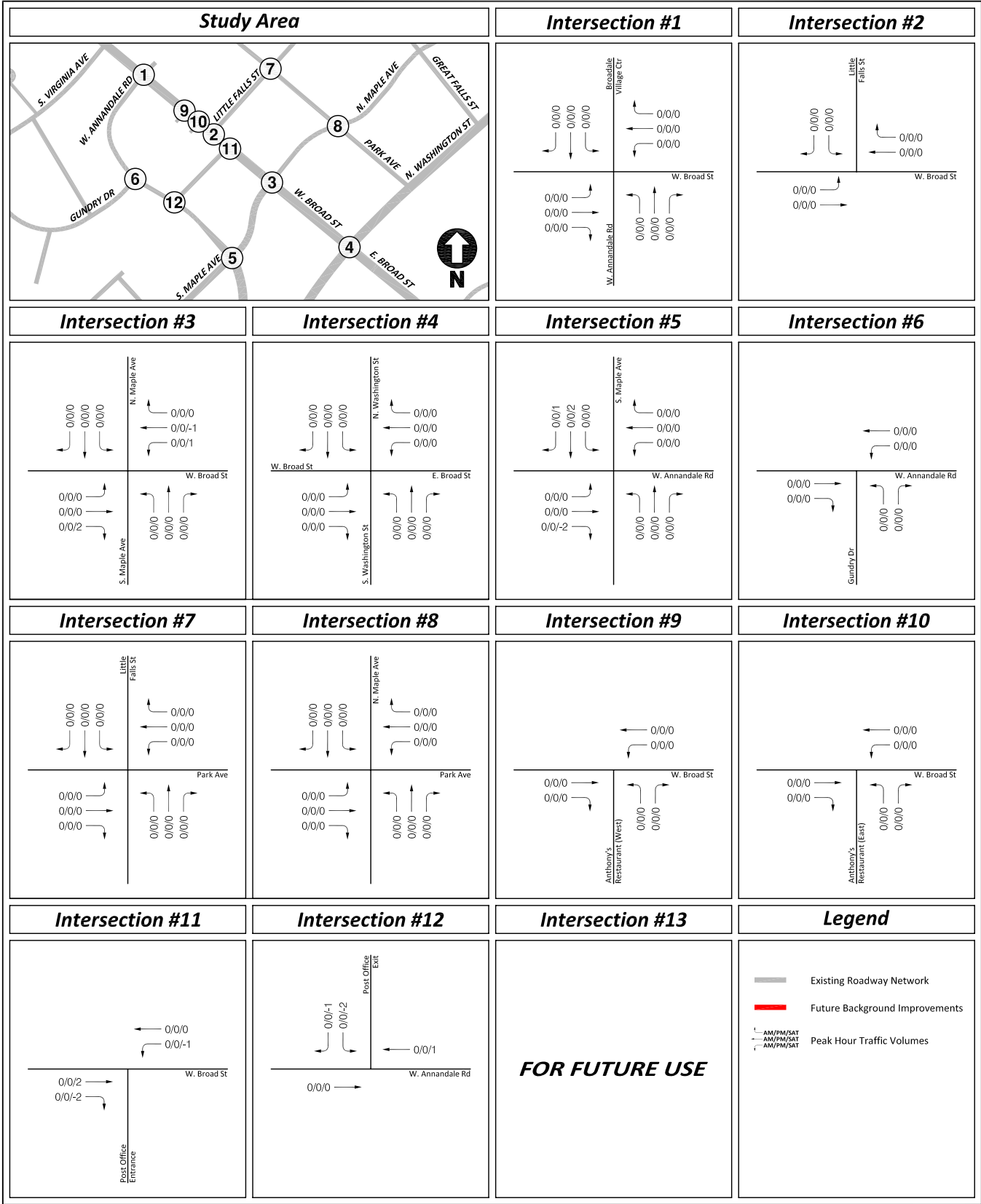


Figure 14: Existing Post Office Access Cut-Thru Traffic Rerouted

## **FUTURE CONDITIONS WITH DEVELOPMENT (2016)**

### ***Future with Development Traffic Volumes***

The existing trips to and from the site were removed from the network, and the proposed site generated development traffic volumes were added to the 2016 future background traffic volumes to project traffic volumes present on the roadways in the vicinity of the development site under the 2016 future with development condition. The traffic volumes for the future with development traffic conditions are shown in Figure 15.

### ***Future with Development Capacity Analysis***

Intersection capacity analyses were performed for the future conditions with the proposed development at the intersections contained within the study area during the weekday morning and afternoon peak hours, as well as the Saturday peak hour. *Synchro*, version 7.0 was used to analyze the study intersections with results based on the Highway Capacity Manual (HCM) methodology. The default peak hour factor of 1.00 has been used in the analysis. Heavy vehicle percentages, lane widths, road grades, and number of bus blockages per hour were kept the same as the existing conditions. The capacity and queuing analysis results are shown in Table 5. The detailed analysis worksheets are contained in Appendix F.

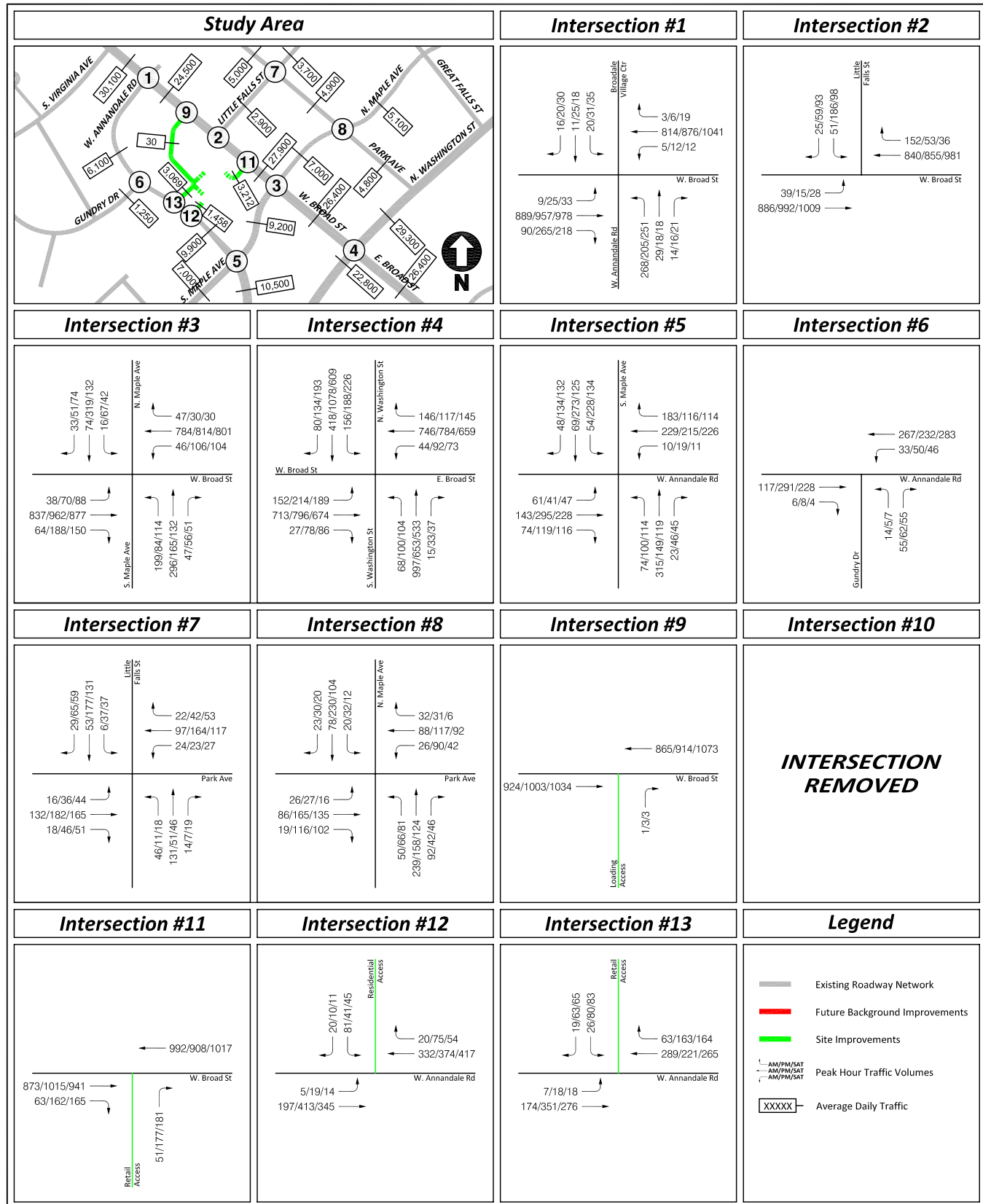


Figure 15: Future with Development (2016) Traffic Volumes

Table 5: Future with Development (2016) Intersection Capacity Analysis

No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak				SAT Peak			
			LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue
1	W. Broad St & W. Annandale Rd													
	<b>Overall Intersection (Signalized)</b>		<b>B</b>	<b>13.0</b>			<b>A</b>	<b>8.3</b>			<b>B</b>	<b>16.7</b>		
	Eastbound Approach	180	A	2.6	28	34	A	5.9	53	62	B	15.8	305	#478
	Westbound Approach	400	B	17.1	189	266	A	3.0	14	63	B	14.1	235	336
	Northbound Approach		C	30.9			C	30.2			C	24.6		
	Northbound Left	80	C	31.8	129	204	C	30.9	99	157	C	25.2	100	152
	Northbound Thru/Right	600	C	25.0	12	35	C	26.2	8	29	C	20.5	6	24
	Southbound Approach	250	D	41.5	17	51	D	42.3	35	78	D	37.0	27	69
2	W. Broad St & Little Falls St													
	<b>Overall Intersection (Signalized)</b>		<b>A</b>	<b>8.5</b>			<b>B</b>	<b>11.0</b>			<b>A</b>	<b>7.8</b>		
	Eastbound Approach	380	A	7.7	273	353	A	8.3	78	136	A	6.1	83	203
	Westbound Approach	335	A	6.9	83	114	B	10.9	118	m136	A	5.6	76	184
	Southbound Approach		D	39.1			C	23.0			C	29.0		
	Southbound Left	110	C	34.0	32	65	C	25.3	110	151	C	29.7	44	73
	Southbound Right	380	D	49.4	8	29	B	15.7	3	11	C	28.3	7	40
3	W. Broad St & N./S. Maple Ave													
	<b>Overall Intersection (Signalized)</b>		<b>B</b>	<b>13.7</b>			<b>C</b>	<b>28.3</b>			<b>C</b>	<b>25.1</b>		
	Eastbound Approach		A	6.1			B	13.4			C	27.2		
	Eastbound Left	160	A	5.4	2	m11	A	6.9	10	m20	B	15.2	21	58
	Eastbound Thru/Right	320	A	6.2	43	83	B	13.8	163	241	C	28.2	241	424
	Westbound Approach		A	5.0			C	28.5			C	21.5		
	Westbound Left	135	A	4.1	4	m6	D	37.7	48	m57	B	16.1	25	66
	Westbound Thru/Right	460	A	5.0	46	m61	C	27.4	217	m246	C	22.1	182	322
	Northbound Approach		D	36.0			D	40.4			C	24.3		
	Northbound Left	370	C	26.2	130	199	D	36.1	44	80	C	20.0	41	101
	Northbound Thru/Right	375	D	41.7	224	320	D	42.0	130	196	C	26.9	79	178
	Southbound Approach		D	35.9			E	61.2			C	31.0		
	Southbound Left	150	C	33.1	7	20	C	28.0	30	61	C	25.4	14	46
	Southbound Thru/Right	385	D	36.3	50	93	E	67.2	226	#398	C	32.2	92	209
<b>Mitigation-Reallocate 2 seconds of green time from the W. Broad St thru phases to the N./S. Maple St thru phases during PM peak hour only</b>														
	<b>Overall Intersection (Signalized)</b>						<b>C</b>	<b>27.6</b>						
	Eastbound Approach						B	14.1						
	Eastbound Left	160					A	7.4	10	m21				
	Eastbound Thru/Right	320					B	14.5	164	278				
	Westbound Approach						C	28.9						
	Westbound Left	135					D	37.9	49	m58				
	Westbound Thru/Right	460					C	27.8	220	m250				
	Northbound Approach						D	38.7						
	Northbound Left	370					C	34.2	42	77				
	Northbound Thru/Right	375					D	40.5	125	189				
	Southbound Approach						D	54.6						
	Southbound Left	150					C	27.3	29	59				
	Southbound Thru/Right	385					E	59.5	219	#373				



No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak				SAT Peak			
			LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue
4	E./W. Broad St & N./S. Washington St													
	<b>Overall Intersection (Signalized)</b>		<b>C</b>	<b>33.9</b>			<b>D</b>	<b>35.8</b>			<b>D</b>	<b>38.8</b>		
	<i>Eastbound Approach</i>		<i>D</i>	<i>44.0</i>			<i>C</i>	<i>32.3</i>			<i>C</i>	<i>31.5</i>		
	Eastbound Left	275	<b>E</b>	<b>72.3</b>	81	m#172	<b>E</b>	<b>78.4</b>	87	m#202	C	26.0	84	189
	Eastbound Thru/Right	445	D	38.2	225	227	C	21.0	225	#285	C	32.9	254	420
	<i>Westbound Approach</i>		<i>C</i>	<i>33.2</i>			<i>D</i>	<i>37.9</i>			<i>D</i>	<i>43.4</i>		
	Westbound Left	255	B	13.0	9	m18	B	19.0	24	51	C	26.6	30	75
	Westbound Thru/Right	1775	C	34.2	286	#402	D	39.9	303	#432	D	44.9	308	494
	<i>Northbound Approach</i>		<i>C</i>	<i>32.9</i>			<i>C</i>	<i>34.9</i>			<i>D</i>	<i>39.4</i>		
	Northbound Left	345	B	19.5	18	m48	C	31.9	45	#69	C	29.7	49	108
	Northbound Thru/Right	820	C	33.8	189	#419	D	35.4	234	294	D	41.2	210	344
	<i>Southbound Approach</i>		<i>C</i>	<i>22.8</i>			<i>D</i>	<i>37.5</i>			<i>D</i>	<i>41.2</i>		
	Southbound Left	190	C	27.4	65	129	C	22.6	39	114	C	29.2	114	220
	Southbound Thru/Right	375	C	21.3	125	166	D	39.8	184	#533	D	44.6	307	492
5	W. Annandale Rd & S. Maple Ave													
	<b>Overall Intersection (Signalized)</b>		<b>C</b>	<b>21.3</b>			<b>B</b>	<b>19.4</b>			<b>A</b>	<b>8.5</b>		
	<i>Eastbound Approach</i>	610	A	5.1	20	42	B	10.5	57	104	A	8.6	16	46
	<i>Westbound Approach</i>	505	A	4.5	4	99	A	3.1	11	21	A	8.3	14	41
	<i>Northbound Approach</i>	1115	D	40.6	126	164	C	27.7	71	98	A	8.5	14	40
	<i>Southbound Approach</i>	375	D	42.7	43	67	C	30.9	178	m174	A	8.7	15	45
6	W. Annandale Rd & Gundry Dr													
	<b>Overall Intersection (Unsignalized)</b>		<b>A</b>	<b>8.9</b>			<b>A</b>	<b>9.6</b>			<b>A</b>	<b>9.6</b>		
	<i>Eastbound Approach</i>	615	A	8.0	n/a	n/a	A	9.7	n/a	n/a	A	9.1	n/a	n/a
	<i>Westbound Approach</i>	600	A	9.5	n/a	n/a	A	9.8	n/a	n/a	B	10.2	n/a	n/a
	<i>Northbound Approach</i>	1900	A	7.8	n/a	n/a	A	8.1	n/a	n/a	A	8.1	n/a	n/a
7	Park Ave & Little Falls St													
	<b>Overall Intersection (Signalized)</b>		<b>C</b>	<b>26.4</b>			<b>C</b>	<b>22.4</b>			<b>B</b>	<b>15.2</b>		
	<i>Eastbound Approach</i>	705	D	45.1	96	154	C	29.6	131	211	B	17.6	76	135
	<i>Westbound Approach</i>	400	D	43.9	79	134	C	28.7	110	180	B	16.3	51	97
	<i>Northbound Approach</i>	385	A	6.9	56	123	B	15.1	31	m61	B	11.4	16	39
	<i>Southbound Approach</i>	640	A	5.0	19	42	B	12.2	88	120	B	13.0	52	97
8	Park Ave & N. Maple Ave													
	<b>Overall Intersection (Unsignalized)</b>		<b>B</b>	<b>11.0</b>			<b>B</b>	<b>14.9</b>			<b>B</b>	<b>10.4</b>		
	<i>Eastbound Approach</i>	375	A	9.7	n/a	n/a	C	15.4	n/a	n/a	B	10.6	n/a	n/a
	<i>Westbound Approach</i>	390	A	9.8	n/a	n/a	B	14.0	n/a	n/a	A	9.8	n/a	n/a
	<i>Northbound Approach</i>	395	B	12.5	n/a	n/a	B	14.6	n/a	n/a	B	11.0	n/a	n/a
	<i>Southbound Approach</i>	530	A	9.2	n/a	n/a	C	15.4	n/a	n/a	A	9.6	n/a	n/a
9	W. Broad St & Loading Access													
	<b>Overall Intersection (Unsignalized)</b>													
	<i>Northbound Approach</i>	100	B	10.1	n/a	0	B	10.4	n/a	0	B	10.7	n/a	0
10	W. Broad St & Anthony's Restaurant (East)													
	<b>Intersection Removed</b>													
11	W. Broad St & Retail Access													
	<b>Overall Intersection (Unsignalized)</b>													
	<i>Northbound Approach</i>	150	A	9.6	n/a	5	B	10.9	n/a	21	B	11.7	n/a	25

No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak				SAT Peak			
			LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue
12	W. Annandale Rd & Residential Access													
	<b>Overall Intersection (Unsignalized)</b>													
	Eastbound Left	215	A	0.2	n/a	0	A	0.5	n/a	1	A	0.5	n/a	1
	Southbound Approach	150	B	13.5	n/a	18	C	17.0	n/a	13	C	16.5	n/a	13
13	W. Annandale Rd & Retail Access													
	<b>Overall Intersection (Unsignalized)</b>													
	Eastbound Left	150	A	0.4	n/a	0	A	0.4	n/a	1	A	0.7	n/a	1
	Southbound Approach	150	B	11.6	n/a	6	B	14.9	n/a	29	B	14.9	n/a	30

Notes: N/A – Not Applicable

# – 95<sup>th</sup> percentile volume exceeds capacity, queue may be longer. Queue shown is the maximum after two cycles.

m – Volume for 95<sup>th</sup> percentile queue is metered by upstream signal.

~ – Volume exceeds capacity, queue can be longer. Queue shown is maximum after two cycles.

As mentioned previously, it is desirable to achieve a LOS D or better per approach. If an acceptable level of service cannot be achieved, then it is desirable for the future with development conditions to be no worse than the network without the new development. Just like the existing and future without development conditions, all of the study intersections' approaches will continue to operate at acceptable levels of service during the weekday morning, afternoon, and Saturday peak hours with the exception of the southbound S. Maple Avenue approach at the W. Broad Street and N./S. Maple Avenue intersection during the weekday PM peak hour only.

Based on the queuing analysis, peak hour queue lengths will continue to exceed the storage length in one or more of the lane groups at the following intersections during one or more of the peak periods:

- W. Broad Street and W. Annandale Road
- W. Broad Street and Little Falls Street (PM only)
- W. Broad Street and N./S. Maple Avenue (PM and Saturday only)
- E./W. Broad Street and N./S. Washington Street (PM and Saturday only)

Based on these results of the capacity analysis, the following mitigation measures are recommended for the future with development scenario:

- *Intersection of W. Broad Street and N./S. Maple Avenue*
  - Adjust the signal timings during the weekday PM peak hour only by reallocating 2 seconds of green time from the mainline W. Broad Street thru phases to the N./S. Maple Avenue thru phases.

Since the results of the analysis showed a non-acceptable level of service for a single approach the southbound S. Maple Avenue approach at the W. Broad Street and N./S. Maple Avenue intersection during the weekday afternoon peak hour only in all three study scenarios, signal timing mitigations were evaluated at this intersection. It was determined that by simply making a very minor signal timing adjustment to traffic signal at the W. Broad Street and N./S. Maple Avenue intersection during the PM peak hour only, all intersection operations within the study area would meet the City's intersection operation standards. Furthermore, this signal timing adjustment will reduce the aforementioned southbound approach's queue length so that it or any of the other lane groups at this intersection exceed the link/storage length during the weekday afternoon peak hour.

The results of the intersection capacity analyses for the future with development conditions (with the recommended improvements) are shown in Figure 16.

In summary, with the recommended signal timing mitigation measures outlined above implemented, all intersection operations within the study area will meet the City's intersection operation standards, thus the proposed redevelopment will have a negligible impact on the surrounding intersections.

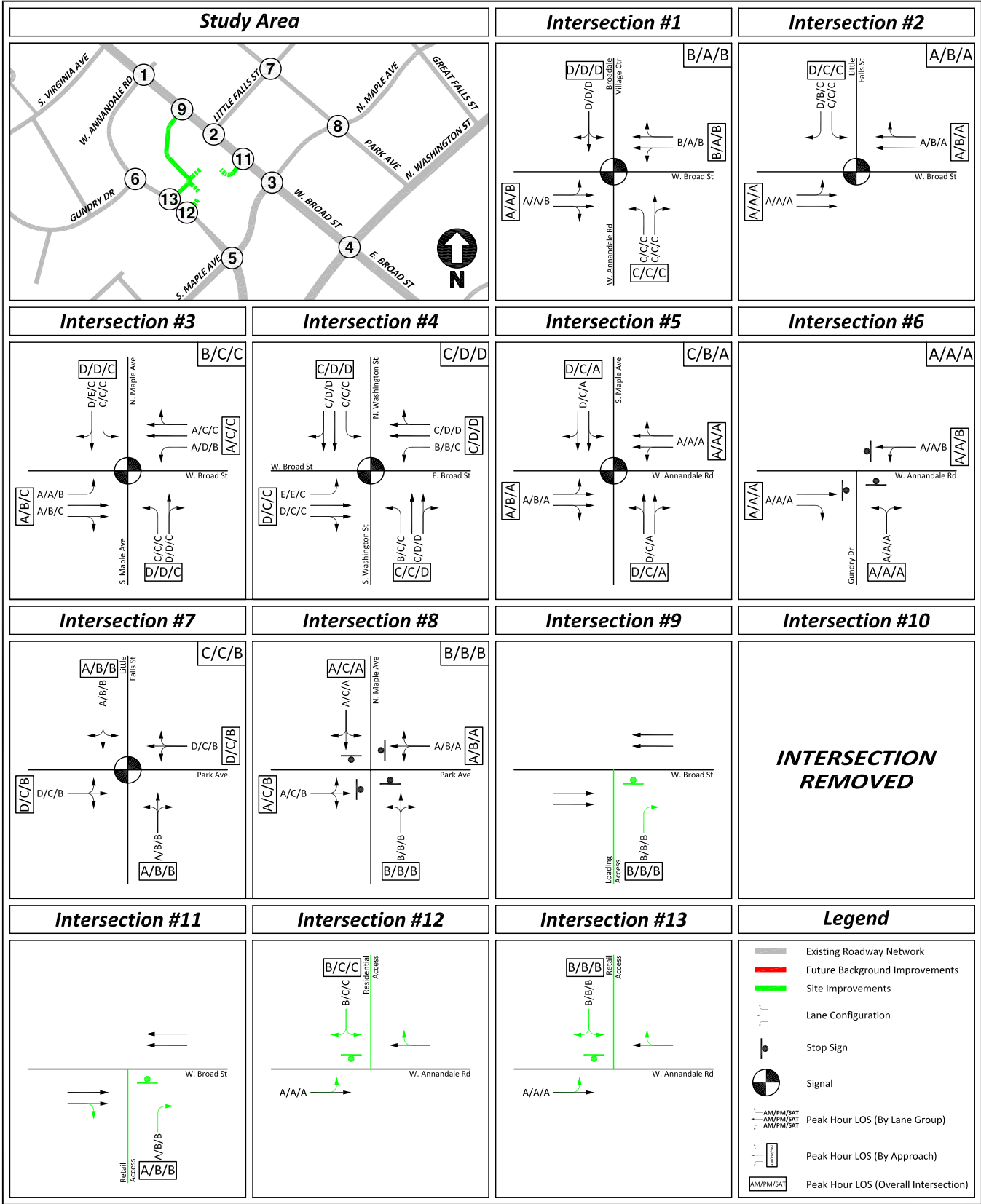


Figure 16: Future with Development (2016) LOS and Recommended Improvements

## PARKING

The existing development consists of approximately 109 surface parking spaces. The proposed development will have a three-level parking garage that contains 573 parking spaces, 368 of which will be dedicated to the residential use and 205 for the commercial use. This supply results in a parking ratio of 1.3 spaces per dwelling unit, and 1 space per 310 square feet of commercial development.

The P1 level of the garage will house the 205 commercial parking spaces and will be accessed from both W. Broad Street and W. Annandale Road. Below P1, the P2 and P3 levels will contain 226 and 142 residential parking spaces, respectively, which will be accessed via W. Annandale Road. As mentioned earlier in the report, the P1 and P2 parking levels are disconnected and vehicles will not be able to travel internally between these two levels of the parking garage, although the P2 and P3 residential levels will be connected. The parking garage's circulation is illustrated in Figure 17, Figure 18, and Figure 19 for the P1, P2, and P3 garage levels respectively.

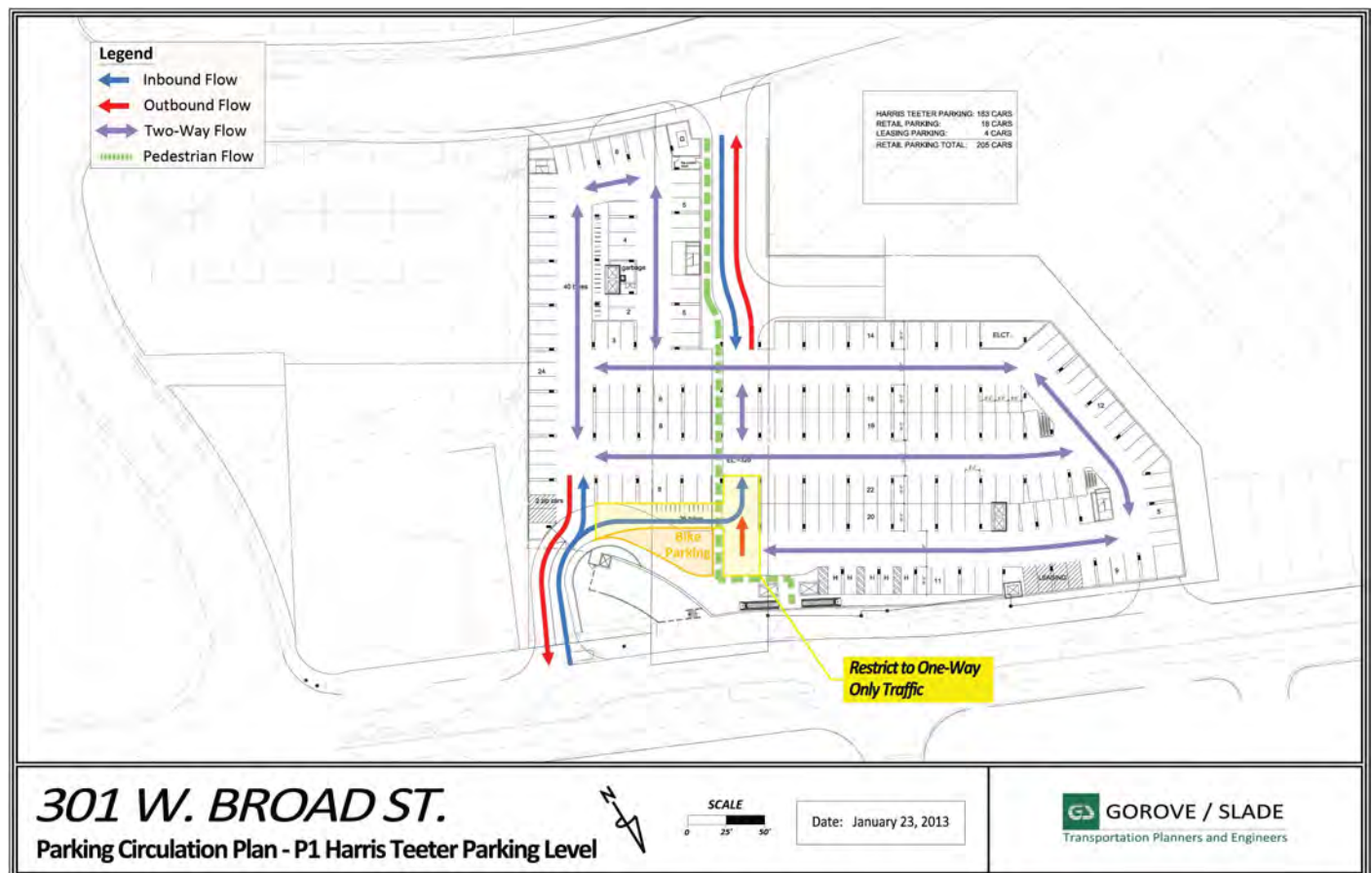


Figure 17: Parking Circulation Plan – P1 Harris Teeter Parking Level

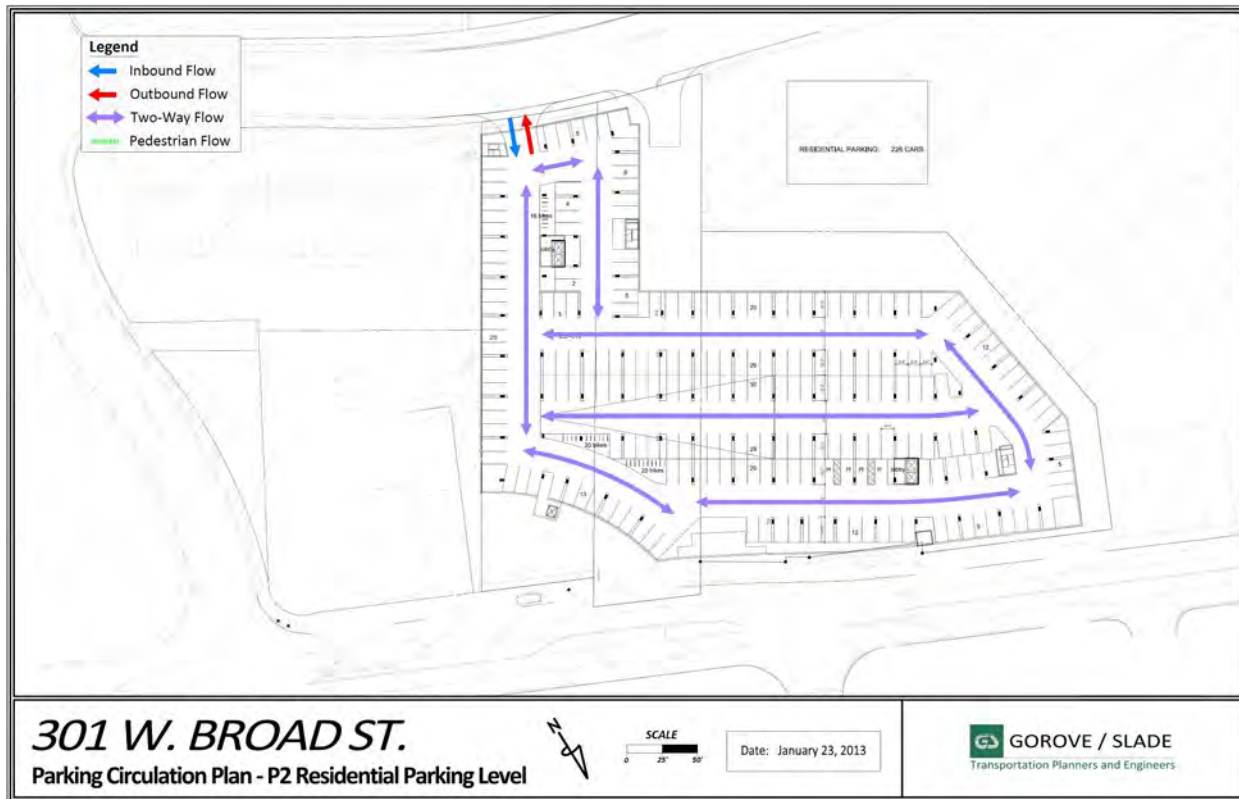


Figure 18: Parking Circulation Plan – P2 Residential Parking Level



Figure 19: Parking Circulation Plan – P3 Residential Parking Level

## TRANSPORTATION DEMAND MANAGEMENT

The proposed 301 W. Broad Street development is located approximately 0.94 miles away from the East Falls Church Metrorail Station as the crow flies. The walking distance from the Metro station to the subject site is approximately 1.2 miles along the Washington & Old Dominion Trail and North Washington Street. A more direct route does not exist due to the lack of connectivity in the street network between the site and the Metro station. On the other hand, the development of 301 W. Broad Street is situated in close vicinity to four major commuter corridors: I-66, Route 7, Route 29, and Route 50 and is served by four existing local bus routes, two of which feature stops adjacent to the site at the W. Broad Street and Little Falls Street intersection.

Transportation Demand Management (TDM) measures have many components that are specifically tailored to promote travel modes that have the least impact on the transportation network and other resources, such as the environment, and discourage those that have the greatest impact. Management measures taken by the 301 W. Broad Street development can be monitored and adjusted as needed to continually create opportunities to reduce the amount of traffic generated by the site. The TDM measures proposed for the redevelopment of 301 W. Broad Street consist of the following strategies:

- Parking Management Plan

The proposed plan will provide a total of approximately 573 parking spaces: 368 for residents and 205 parking spaces reserved exclusively for retail patrons. The parking management plan will consist of the following strategies:

- Provide effective directional signage to direct residents and visitors to the appropriate locations in the parking garage;
- Residential parking spaces will not be bundled with units and leases. Unbundling parking from units and leases reduces parking demand because individuals are less likely to pay for and use parking when they know the cost and there are alternative travel options; and
- Two parking spaces for the increasingly popular car share program Zipcar, which currently lacks any parking spaces within the City of Falls Church, will be reserved in the parking garage, providing a convenience for residents who don't own an automobile and for the car-less supermarket's customers who use car sharing as an occasional method of transporting their groceries home;

- Appoint Transportation Management Plan Coordinator

Designate a member(s) of building management or leasing office to serve in the unofficial position of the Transportation Management Plan Coordinator. The TMP Coordinator would have duties such as the following:

- Distribute literature and promotional materials concerning regional transit services five times per year to the tenants and residents at the site. Display information regarding transit routes, schedules, fares, etc. in common areas;
- Create and maintain a closed circuit television channel (CCTV) for the tenants within the building that contains the latest information regarding the nearby Metrobus bus routes and schedules, including any transit service interruptions. In addition, the channel will publicize the Commuter Connections website and their services, including the Guaranteed Ride Home program and ride-matching service;



- Encourage participation in the region-wide Air Quality Action Days via providing Air Quality Code Red Day alert notifications on both the property management website and CCTV channel;
  - Provide links on the property management's website to sites, such as <http://www.commuterconnections.org>, which will serve as the platform in which the residents can interact for the purpose of setting up carpools. The property management's website may also act as a central carpooling organizer for residents in the building, where residents can login to post destination inquiries and carpool requests. Links to websites for the local transit opportunities, such as Metro (<http://www.wmata.com>) will also be provided; and
  - Conduct annual transportation surveys and adjust the TDM plan accordingly.
- *Bicycle Accommodations*
- The following considerations should be made to encourage more bicycling amongst the building's residents and to enhance the bicycling conditions in the area surrounding the site:
- A minimum of 107 bicycle parking spaces will be provided in accordance with City of Alexandria and Arlington County bicycle parking guidelines
  - Ample secure bicycle parking/storage facilities will be provided on-site in the parking garage;
  - Install bicycle racks along the sidewalk adjacent to the site's property frontage along W. Broad Street; and
  - Set aside an area in the northeast corner of the site's property for the future Capital Bikeshare station proposed in the City of Fall Church's Pedestrian, Bicycle, and Traffic Calming Strategic Implementation Plan as Capital Bikeshare is likely to have either just expanded or be on the edge of expanding into the City of Falls by the site's 2016 buildout year.
- *Pedestrian/Transit Considerations*
- The following considerations for improved access to transit are to enhance safety and convenience for transit users:
- Construct a bus stop with appropriate signage, shelter, and landing pad amenities, such as bus schedule and real-time route information if available, in the location of the existing bus stop situated in the southwest quadrant of the W. Broad Street and Little Falls Street intersection;
  - Fund the construction, delineation, and signalization of the missing western north/south pedestrian crossing movement at the W. Broad Street and Little Falls Street intersection where no crosswalk or controlled crossing currently exists. This potential crosswalk would be adjacent to the existing bus stop mentioned above and very close to the other bus stop located in the northwest quadrant of this intersection; and
  - Explore a coordinated approach to transit opportunities with other projects/developments/apartment buildings located in the vicinity of the site to potentially create a bus service providing direct access between each participating building and the East Falls Church Metrorail station.

## SIGHT DISTANCE ANALYSES

Horizontal sight distance analyses were performed at each of the proposed site access points with the exception of the Loading Access since it is restricted to outbound loading traffic only, based on the sight distance guidelines documented on pages F-34 and F-35 in Appendix F of the VDOT Road Design Manual. The analyses are based on the principles of stopping sight distance (SSD) and intersection sight distance (ISD), which are explained below.

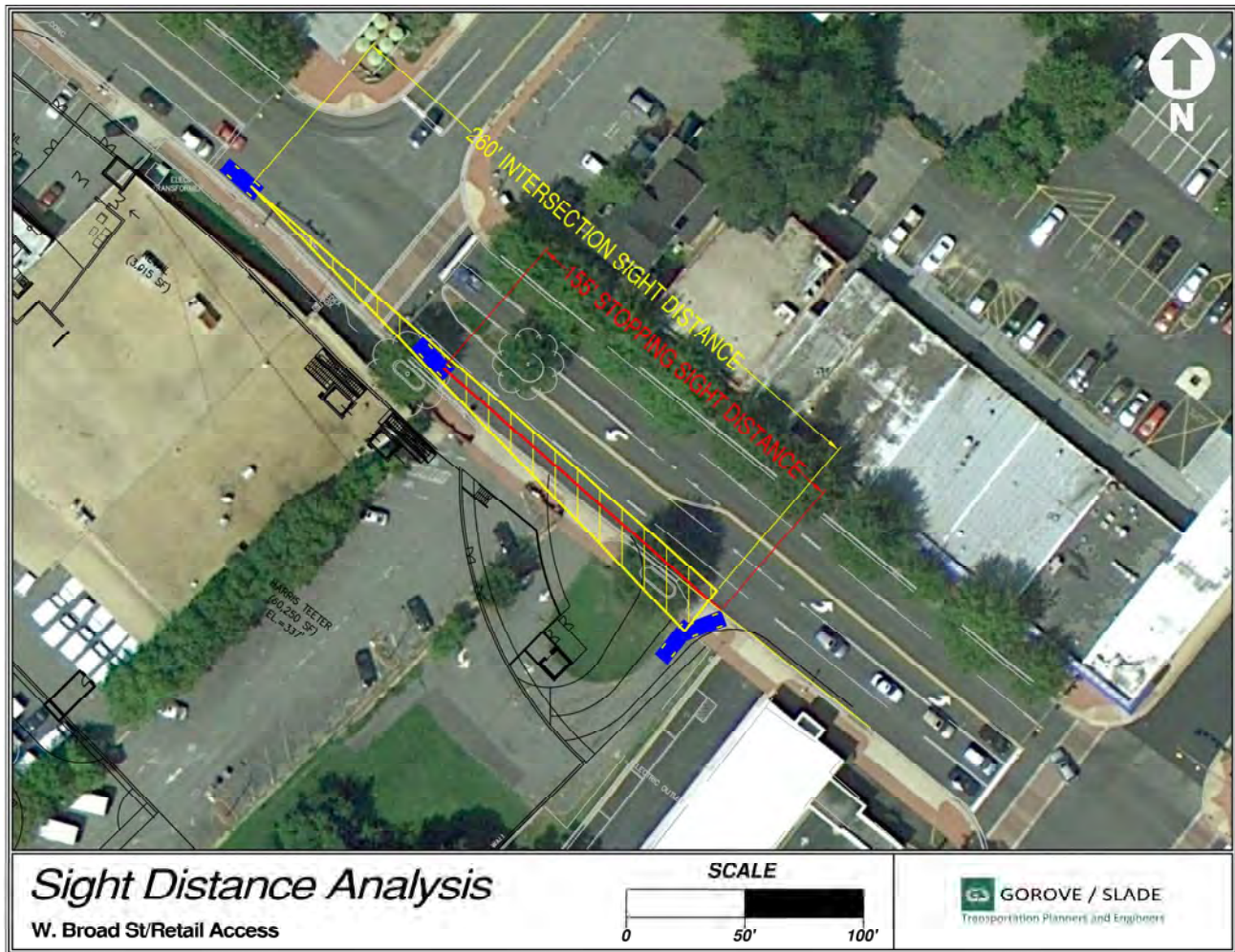
At a minimum, stopping sight distance should be provided along a roadway. SSD is the distance required for a motorist traveling at design speed on the major roadway to react to an obstruction of some kind and come to a complete stop in order to avoid a collision. A second measure of sight distance is intersection sight distance. A driver waiting to exit a minor-street approach or driveway should have sufficient visibility along the major roadway in both directions to see oncoming vehicles and make a decision as to whether or not there is enough time to complete a turning maneuver onto the major roadway without undue interference from the traffic on the major roadway. Any objects that fall within the “clear sight triangle” and break the sight lines of the motorist interfere with SSD and ISD.

ISD typically requires longer sight distances and larger clear zones than SSD. Access points and adjacent areas should be designed such that ISD is met or exceeded along the major roadway. If ISD is not attainable due to constraints, then the largest possible ISD should be attained, provided that SSD requirements are met or exceeded. For proper ISD to be attained, the clear sight triangle should remain clear of sight-obstructing features such as trees, landscaping, benches, and parked cars. ISD is considered to be the desirable condition, and SSD is considered to be the minimum condition. In urban locales such as the City of Falls Church, ISD is rarely attainable, and the minimum design goal typically becomes the provision of SSD.

Figure 20, Figure 21, and Figure 22 show the horizontal sight lines superimposed on the proposed development plan at each of the three site entrances with aerial imagery of the study area placed in the background as a reference. In accordance with AASHTO and VDOT policies, for intersection sight distance, the decision point (location of the driver waiting to turn onto the major roadway) is located a minimum of 14.5 feet from the edge of the major roadway.

For stopping sight distance, in cases where there are obstacles such as parallel-parked vehicles along the roadway, a driver wishing to turn onto the cross-street will inch forward until a clear view of potential oncoming vehicles is attained. In these cases, the minimum sight line would be drawn from the approaching driver’s eye, to the front edge of the departing motorist’s car as it became visible beyond the edge of a row of parked vehicles.

The existing posted speed limit on all of the major roadways, W. Broad Street and W. Annandale Road, containing the site access points to the site is 25 mph. Since the design speed, which is normally used in sight distance calculations is unavailable for these two roadways, in accordance with the guidelines specified on page F-35 in Appendix F of the VDOT Road Design Manual, the legal speed, or posted speed limit, was used throughout the analyses.



**Figure 20: Sight Distance Analysis – W. Broad Street & Retail Access**

Figure 20 depicts the sight distance lines for vehicles exiting the parking garage onto W. Broad Street. Both intersection sight distance and stopping sight distance are attainable at this site access since the tree obstructing both sight lines will have to be removed when the entrance is constructed, which as mentioned throughout the report is a right-in/right-out partial access.



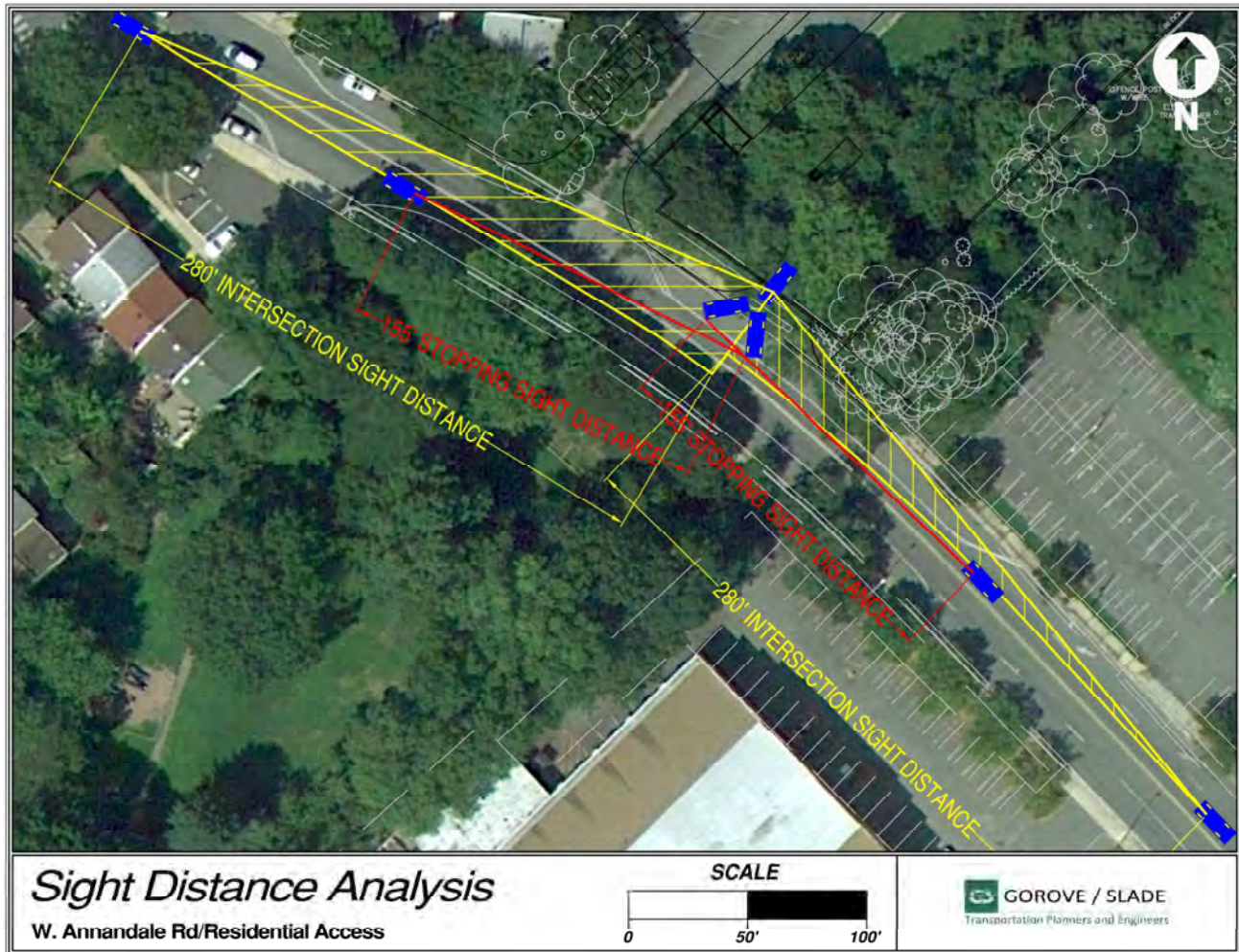
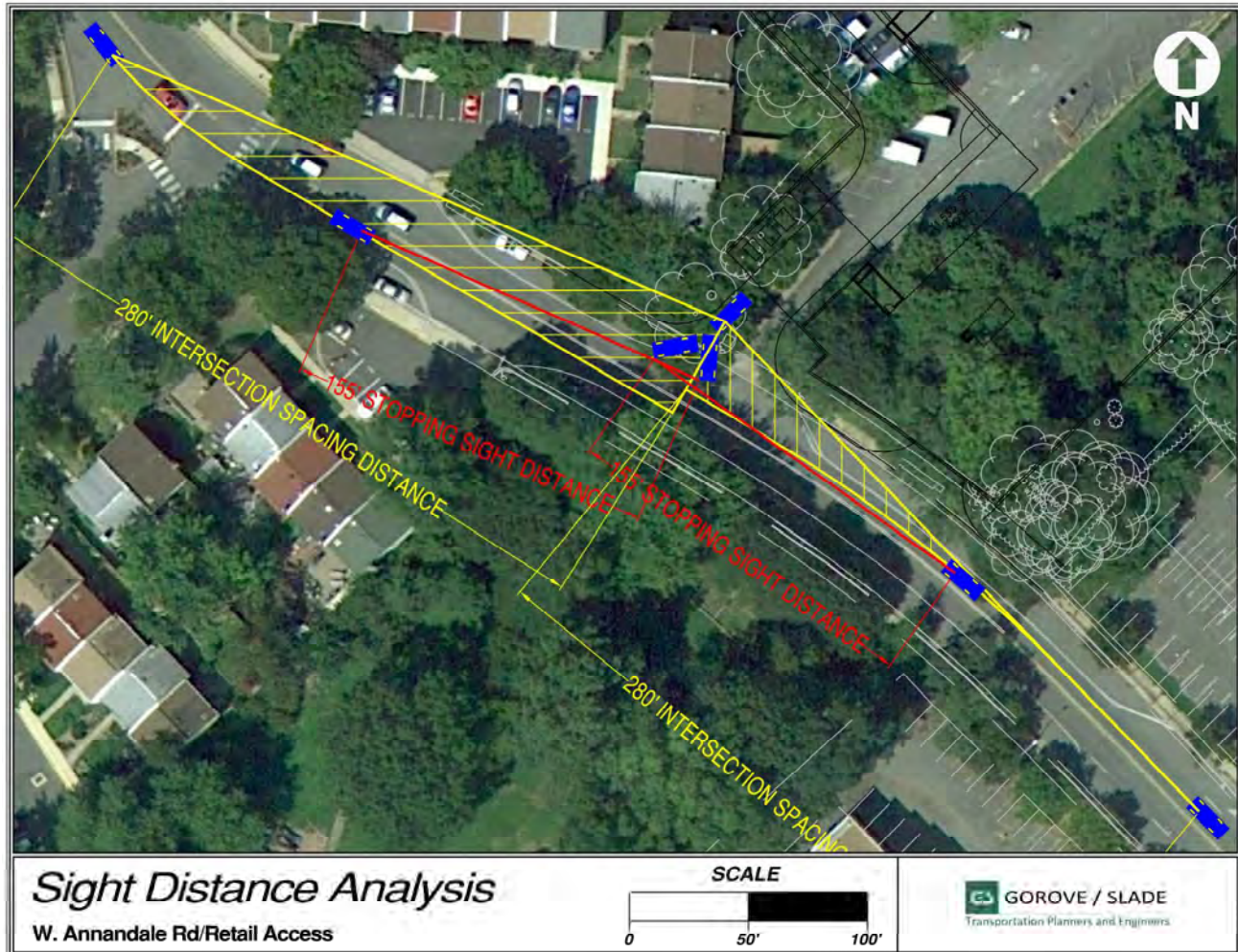


Figure 21: Sight Distance Analysis – W. Annandale Road & Residential Access

Figure 21 depicts the sight distances for vehicles exiting the upper level of the parking garage onto W. Annandale Road. Intersection sight distance is attainable here as long as there are no parked vehicles along the north side of W. Annandale Road. The on-street parking areas along the north side of W. Annandale Road will have to be adjusted if the proposed redevelopment project moves forward as the current parallel parking area interferes with the driveway. Stopping sight distance is provided at this intersection.



**Figure 22: Sight Distance Analysis – W. Annandale Road & Retail Access**

Figure 22 depicts the sight distances for vehicles exiting the lower level of the parking garage onto W. Annandale Road. Intersection sight distance is attainable here as long as there are no parked vehicles along the north side of W. Annandale Road. The on-street parking areas along the north side of W. Annandale Road will have to be adjusted if the proposed redevelopment project moves forward as the current parallel parking area slightly interferes with the driveway. Stopping sight distance is provided at this intersection.



## INTERSECTION ALTERNATIVE ANALYSIS

As requested at the scoping meeting with City of Falls Church staff, an intersection alternative analysis was performed for the intersection of W. Annandale Road and S. Maple Avenue. This analysis examined two alternatives at this intersection under the future with development conditions (2016). The two alternatives considered included the addition of separate left turn phasing to the existing traffic signal and the possibility of converting this intersection to a roundabout.

### Left Turn Phasing Analysis

A separate left turn phase warrant was evaluated at the W. Annandale Road and S. Maple Avenue intersection using the methodology set forth in Appendix IVB-8 of VDOT's Traffic Engineering Design Manual. The results of this analysis showed that the traffic volumes on the subject intersection's four approaches were not close to satisfying the VDOT warrants for a separate left turn phase. Nonetheless, since there is at least a somewhat significant amount of north and southbound left turn traffic volumes during the weekday afternoon peak hour and to quantify how the intersection would operate with protected/permissive left turn phasing along these approaches, an intersection capacity analysis was performed under the future with development (2016) conditions. The results of this analysis are shown in the shaded portion of Table 6, with the results from the total future scenario shown above it in the non-shaded part for ease of comparison. It should be noted that currently the northbound and southbound approaches both consist of one shared thru/left turn lane and one shared thru/right turn lane. This study assumes that if protected/permissive phasing were added to this traffic signal the northbound and southbound approaches would both consist of one left turn drop lane and one shared thru/right turn lane.

**Table 6: Intersection Alternative Comparison (Left Turn Phasing)**

Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak				SAT Peak			
		LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue
W. Annandale Rd & S. Maple Ave (total future results from Table 5)													
Overall Intersection (Signalized)		C	21.3			B	19.4			A	8.5		
Eastbound Approach	610	A	5.1	20	42	B	10.5	57	104	A	8.6	16	46
Westbound Approach	505	A	4.5	4	99	A	3.1	11	21	A	8.3	14	41
Northbound Approach	1115	D	40.6	126	164	C	27.7	71	98	A	8.5	14	40
Southbound Approach	375	D	42.7	43	67	C	30.9	178	m174	A	8.7	15	45
W. Annandale Rd & S. Maple Ave (with left turn phasing along Maple Ave)													
Overall Intersection (Signalized)		C	25.4			C	25.2			B	13.9		
Eastbound Approach	610	B	11.7	35	73	B	15.8	77	135	B	14.7	37	83
Westbound Approach	505	B	19.2	97	136	A	9.2	17	122	B	14.2	30	70
Northbound Approach		D	39.8			C	28.9			B	13.1		
Northbound Left	1115	C	25.1	31	51	C	25.3	38	59	B	10.4	14	42
Northbound Thru/Right	1115	D	43.0	199	268	C	30.8	91	134	B	15.0	32	85
Southbound Approach		C	28.5			D	39.1			B	13.5		
Southbound Left	375	C	26.3	24	m39	C	29.3	115	m139	A	9.7	17	48
Southbound Thru/Right	375	C	29.5	33	60	D	44.6	241	m299	B	15.5	44	119

Notes: N/A – Not Applicable

m – Volume for 95<sup>th</sup> percentile queue is metered by upstream signal.

The results of the capacity analysis show that the addition of protected/permissive left turn phasing along the north and southbound approaches would have a detrimental effect on the intersection's operations during all peak hours since there is not enough opposing left turn movement traffic volumes to justify separate left turn phasing at this intersection.

## Roundabout Analysis

Previously, in the 2008 Atlantic Realty – Falls Church City Center traffic impact study, a roundabout was recommended and proposed to be constructed at the intersection of W. Annandale Road and S. Maple Avenue. This intersection is well suited to be converted to a roundabout since there is no defined major or minor-street and the major-street volumes are not significantly higher than the minor-street volumes. Therefore, a roundabout capacity analysis was performed at the subject intersection using *Synchro, version 8.0* software with results based on the Highway Capacity Manual 2010 (HCM 2010) methodology, which is the first edition of the HCM to include a roundabout capacity model for single-lane and multi-lane roundabouts. The results of this analysis are shown in the shaded portion of Table 7, with the results from the total future scenario shown above it in the non-shaded part to make it easy to compare the results. This study analyzed this roundabout assuming it was a single-lane roundabout with each approach consisting of one shared left/thru/right turn lane except the westbound approach, which was assumed to consist of one shared thru/left turn lane and one free-flow channelized right turn lane. The channelized westbound right turn lane was considered a natural fit here since the geometry of both the westbound and northbound approaches consist of four-lane undivided cross-sections.

**Table 7: Intersection Alternative Comparison (Roundabout)**

Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak				SAT Peak			
		LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue	LOS	Delay	50 <sup>th</sup> Queue	95 <sup>th</sup> Queue
W. Annandale Rd & S. Maple Ave (total future results from Table 5)													
Overall Intersection (Signalized)		C	21.3			B	19.4			A	8.5		
Eastbound Approach	610	A	5.1	20	42	B	10.5	57	104	A	8.6	16	46
Westbound Approach	505	A	4.5	4	99	A	3.1	11	21	A	8.3	14	41
Northbound Approach	1115	D	40.6	126	164	C	27.7	71	98	A	8.5	14	40
Southbound Approach	375	D	42.7	43	67	C	30.9	178	m174	A	8.7	15	45
W. Annandale Rd & S. Maple Ave (Roundabout)													
Overall Intersection (Signalized)		A	7.5			C	17.7			A	9.4		
Eastbound Approach	610	A	6.6	n/a	25	C	20.8	n/a	150	B	10.3	n/a	75
Westbound Approach		A	5.4			A	5.0			A	5.0		
Westbound Left/Thru	505	A	9.5	n/a	50	A	7.5	n/a	25	A	7.5	n/a	25
Westbound Right	505	A	0.0	n/a	0	A	0.0	n/a	0	A	0.0	n/a	0
Northbound Approach	1115	B	10.5	n/a	75	B	13.3	n/a	75	A	9.9	n/a	50
Southbound Approach	375	A	6.7	n/a	25	C	24.7	n/a	225	B	11.9	n/a	75

Notes: N/A – Not Applicable

m – Volume for 95<sup>th</sup> percentile queue is metered by upstream signal.

The results of the roundabout analysis prove that a roundabout is a viable alternative at this location and would improve the intersection's operations during weekday morning and afternoon peak hours. Moreover, the potential roundabout would greatly reduce the queuing along all approaches and improve the intersection safety at this location based on knowledge and research recorded on the past performance of roundabouts in general.



## CONCLUSIONS

This report presents the findings of a traffic impact analysis for the proposed redevelopment of 301 W. Broad Street located in the City of Falls Church. The site is bounded by W. Broad Street (Route 7) to the north and W. Annandale Road to the south. The development, which is planned to consist of one multi-use building featuring a 60,000 square foot supermarket, 282 apartments, and 3,470 square feet of ground floor retail, is anticipated to be complete in 2016. This study evaluated the proposed development assuming a 60,883 square foot supermarket, 294 apartments, and 4,011 square feet of ground floor retail, all of which are slightly larger than their currently proposed areas, in order to allow for flexibility in the event there are any minor adjustments to the final development plan floor area calculations.

The analysis presented in this report supports the following major conclusions:

### **Existing Conditions (2012)**

Weekday traffic counts were conducted at the study intersections during the AM and PM peak periods on Thursday, June 7; Tuesday, July 10; and Tuesday, August 28, 2012. Saturday peak period traffic counts were conducted on the following Saturdays: June 2, July 14, and August 25, 2012. The intersection volumes were balanced to reflect a consistent baseline for the volume projections within this report.

Intersection capacity analyses were performed for the existing conditions at the study area intersections during the weekday morning and afternoon peak hours, as well as the Saturday peak hour. *Synchro, version 7.0* was used to analyze the study intersections with results based on the Highway Capacity Manual (HCM) methodology. For the purpose of this analysis, it is desirable to achieve a LOS D or better for each approach of an intersection. If an acceptable level of service cannot be achieved, then it is desirable for the future with development conditions to be no worse than the network without the new development. All of the study intersections' approaches currently operate at acceptable levels of service during the weekday morning, afternoon, and Saturday peak hours with the exception of the southbound S. Maple Avenue approach at the W. Broad Street and N./S. Maple Avenue intersection during the weekday PM peak hour only.

Based on the queuing analysis, peak hour queue lengths currently exceed the storage lengths in one or more of the lane groups at the following intersections during one or more of the peak periods:

- W. Broad Street and W. Annandale Road
- W. Broad Street and Little Falls Street (PM only)
- W. Broad Street and N./S. Maple Avenue (Saturday only)
- E./W. Broad Street and N./S. Washington Street (PM and Saturday only)

As there are currently no road improvements being constructed at the study intersections, there was no mitigation assumed in the analysis moving forward into the future without development analysis.

### **Future Conditions without Development (2016)**

Traffic volumes were projected for the year 2016 without the proposed redevelopment of 301 W. Broad Street. The base traffic volumes used in this scenario were the existing (2012) conditions volumes. A 1.0% annual inherent growth rate was applied to these volumes.

As mentioned previously, it is desirable to achieve a LOS D or better per approach. If an acceptable level of service cannot be achieved, then it is desirable for the future with development conditions to be no worse than the network without the new development. Just like the existing conditions, all of the study intersections' approaches will continue to operate at

acceptable levels of service during the weekday morning, afternoon, and Saturday peak hours with the exception of the southbound S. Maple Avenue approach at the W. Broad Street and N./S. Maple Avenue intersection during the weekday PM peak hour only.

Based on the queuing analysis, peak hour queue lengths will continue to exceed the storage length in one or more of the lane groups at the following intersections during one or more of the peak periods:

- W. Broad Street and W. Annandale Road
- W. Broad Street and Little Falls Street (PM only)
- W. Broad Street and N./S. Maple Avenue (Saturday only)
- E./W. Broad Street and N./S. Washington Street (PM and Saturday only)

As there are currently no road improvements being funded or planned at the study intersections by 2016, there was no mitigation assumed in the analysis moving forward into the future with development analysis.

#### **Future Conditions with Development (2016)**

The proposed development plan calls for the construction of an approximately 60,000 square foot supermarket, 282 apartments, and 3,470 square feet of ground floor retail in one multi-use building. This study evaluated the proposed development assuming a 60,883 square foot supermarket, 294 apartments, and 4,011 square feet of ground floor retail, all of which are slightly larger than their currently proposed areas, in order to allow for flexibility in the event there are any minor adjustments to the final development plan floor area calculations. Access to the proposed development will be provided via two partial-access entrances along W. Broad Street, the westernmost of which will be a one-way right-out only access used exclusively for loading operations, trash collection, and service vehicle access. In addition, two full-access site entrances are proposed along W. Annandale Road. The proposed redevelopment will generate approximately 238 new trips during the weekday morning peak hour, 493 new trips during the weekday afternoon peak hour, 439 new trips during the Saturday peak hour, and 4,645 new weekday daily trips.

As mentioned previously, it is desirable to achieve a LOS D or better per approach. If an acceptable level of service cannot be achieved, then it is desirable for the future with development conditions to be no worse than the network without the new development. Just like the existing and future without development conditions, all of the study intersections' approaches will continue to operate at acceptable levels of service during the weekday morning, afternoon, and Saturday peak hours with the exception of the southbound S. Maple Avenue approach at the W. Broad Street and N./S. Maple Avenue intersection during the weekday PM peak hour only.

Based on the queuing analysis, peak hour queue lengths will continue to exceed the storage length in one or more of the lane groups at the following intersections during one or more of the peak periods:

- W. Broad Street and W. Annandale Road
- W. Broad Street and Little Falls Street (PM only)
- W. Broad Street and N./S. Maple Avenue (PM and Saturday only)
- E./W. Broad Street and N./S. Washington Street (PM and Saturday only)

Based on these results of the capacity analysis, the following mitigation measures are recommended for the future with development scenario:

- *Intersection of W. Broad Street and N./S. Maple Avenue*
  - Adjust the signal timings during the weekday PM peak hour only by reallocating 2 seconds of green time from the mainline W. Broad Street thru phases to the N./S. Maple Avenue thru phases.

Since the results of the analysis showed a non-acceptable level of service for a single approach the southbound S. Maple Avenue approach at the W. Broad Street and N./S. Maple Avenue intersection during the weekday afternoon peak hour only in all three study scenarios, signal timing mitigations were evaluated at this intersection. It was determined that by simply making a very minor signal timing adjustment to traffic signal at the W. Broad Street and N./S. Maple Avenue intersection during the PM peak hour only, all intersection operations within the study area would meet the City's intersection operation standards. Furthermore, this signal timing adjustment will reduce the aforementioned southbound approach's queue length so that it or any of the other lane groups at this intersection exceed the link/storage length during the weekday afternoon peak hour.

In summary, with the recommended signal timing mitigation measures outlined above implemented, all intersection operations within the study area will meet the City's intersection operation standards, thus the proposed redevelopment will have a negligible impact on the surrounding intersections.